CARLSON ENVIRONMENTAL, INC.

CLEAN HARBORS OF CHICAGO, INC. FACILITY

CHICAGO, ILLINOIS

RCRA FACILITY INVESTIGATION

PHASE II / III WORK PLAN

VOLUME 1 OF 1

MAY 1996

CARLSON ENVIRONMENTAL, Inc.

RCRA FACILITY INVESTIGATION
COMBINED PHASE II / III WORK PLAN

Clean Harbors of Chicago, Inc.
11800 South Stony Island Avenue
Chicago, Illinois

Prepared by
CARLSON ENVIRONMENTAL, INC.
312 West Randolph Street
Suite 300
Chicago, Illinois 60606
(312) 346-2140

Project No. 8666
May 1996

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS (Continued)

FIGURES

TABLES

ATTACHMENTS

CARLSON ENVIRONMENTAL, Inc.

1.0 INTRODUCTION

1.1 Purpose of the RFI Combined Phase II/III Work Plan

This RCRA Facility Investigation (RFI) Combined Phase II/III Work Plan has been prepared to fulfill corrective action requirements identified in the Clean Harbors of Chicago, Inc., Final RCRA Part B permit. Detailed background information on the Clean Harbors of Chicago, Inc. facility (Clean Harbors or Site) and procedures used in conducting Phase I of the RFI are found in the RFI Phase I Work Plan and RFI Phase I Report. Information regarding potential receptors is also contained in the RFI Phase I Report. The purpose of the RFI is to determine whether releases of hazardous wastes or hazardous constituents have occurred at the facility, and if so, the nature and extent of such releases. The results of the RFI will be used to develop a Corrective Action Plan (CAP) which identifies actions necessary, if any, to protect human health and the environment.

Clean Harbors has expanded its operations to an adjacent facility at 11700 South Stony Island Avenue previously operated by Chemical Waste Management (CWM). The facility is composed of two entirely separate operational areas including the subject facility or the "southern portion" and the adjacent facility or the "northern portion." On March 17, 1995, the IEPA issued a draft modified RCRA Part B Permit which covers current and proposed activities on both portions. Clean Harbors currently is conducting corrective action activities as separate projects on the respective "southern" and "northern" portions of the facility. This RFI Combined Phase II/III Work Plan addresses only the activities on the "southern" portion.

1.2 Project Background

The Site has been utilized as a waste treatment, storage and disposal facility since its construction in the early-1970s. International Hydronics Corporation (also known as Hyon Corporation (Hyon)) occupied the Site until approximately 1976 with Envirotherm taking over operations until 1980. In 1980, Chem Clear, Inc. (Chem Clear) took over the Site, developed a waste management facility and submitted a RCRA Part A permit application (Part A) to the United States Environmental Protection Agency (US EPA). Chem Clear submitted the original RCRA Part B permit application to the Illinois Environmental Protection Agency (IEPA) in 1983 and revisions were submitted by its successor, Clean Harbors, in September 1990, February 1991 and December 1992. Clean Harbors took over operations and has occupied the Site since approximately 1989.

The IEPA conducted a RCRA Facility Assessment (RFA) at the Site in April 1991 and identified 25 Solid Waste Management Units (SWMUs) which required evaluation for their potential for releases to soil (Ref. 9) (A copy of the RFI is included as Attachment C in the RFI Phase I Work Plan). On September 30, 1993, the US EPA and the IEPA granted a RCRA Part B permit to Clean Harbors for its existing and proposed operations at the Site. The corrective action provisions of the RCRA Part B permit identified the 25 SWMUs which were listed in the RFA as requiring evaluation in the RFI at the Site. The 25 SWMUs were discussed in a December 17, 1993, meeting between representatives of Clean Harbors, Carlson Environmental, Inc. (CEI) and IEPA. IEPA representatives visited the Clean Harbors facility and inspected the 25 SWMUs on January 5, 1994. Based on the meeting and Site inspection, the IEPA reduced the number of SWMUs to be evaluated in the RFI from 25 to 18. The IEPA also identified specific actions which must be conducted for each of the 18 RFI SWMUs. These actions included conducting soil sampling/analysis and integrity inspections. The results of the integrity inspection and a Site-Specific Sampling Plan for addressing each SWMU were included in the RFI Phase I Work Plan, submitted to the IEPA in August 1994 and approved on November 28, 1994. The RFI Phase I Report, which addressed the RFI Phase I activities at the site, was submitted to the IEPA in June 1995. After a review of the RFI Phase I Report, the IEPA determined that a combined Phase II/III RFI should be implemented for several of the SWMUs at the site.

Detailed background information on the Clean Harbors of Chicago, Inc. facility (Site) and procedures used in conducting Phase I of the RFI are found in the RFI Phase I Work Plan and RFI Phase I Report.

2.0 GENERAL FACILITY INFORMATION

2.1 Facility Description

The Clean Harbors facility is located on the eastern shore of Lake Calumet in Chicago, Cook County, Illinois. The area in which the Site is located is primarily industrial and contains several current and historical waste treatment, storage and disposal (TSD) facilities (See Figure One - Area Map). The facility is situated on an approximately 26.5 acre earthen pier that was fabricated of fill material in the early-1970s. The eastern portion of the Site is developed and contains buildings and equipment for the treatment, storage, consolidation and/or transport of hazardous and nonhazardous wastes. The western portion, approximately 13.5 acres, is currently undeveloped and is covered with heavy vegetation and debris piles. The western boundary of the property, as well as three-quarters of the northern and southern boundaries, are bounded by Lake Calumet. Stony Island Avenue is the eastern boundary of the Site. The Site property is owned by the Illinois International Port District and the address is 11800 South Stony Island Avenue (See Figure One - Area Map).

The earthen pier, on which the facility is situated, is approximately 2,500 feet long by 400 feet wide and was constructed of fill material consisting mostly of cinder, sand, silt, clay and organics. The fill material also reportedly contained slag generated by nearby steel mills.

The Site has been utilized as a waste treatment, storage and disposal facility since its construction in the early-1970s. The facility currently accepts for treatment nonhazardous wastes, characteristic hazardous wastes and one "listed" waste (K062) under RCRA. For storage, consolidation and transfer, the existing facility accepts a wide range of hazardous and nonhazardous wastes (Ref. 3). Planned activities at the Site in the future include the storage of listed hazardous waste and the construction of a new process building for the treatment of listed hazardous waste. Prior to 1988, previous occupants of the Site accepted a variety of listed wastes for treatment.

2.2 Site Physiography

The Site lies within the physiographic area known as the Chicago Lake Plain which is relatively flat and poorly drained (Ref. 16). The facility is situated on a man-made earthen pier in Lake Calumet which is located in the southeast portion of Chicago, Cook County, Illinois near the Illinois/Indiana border. The district is zoned "heavily industrial" and used primarily by waste management and disposal facilities.

Surface water drainage at the property consists of two principle flow patterns. Precipitation falling on the western portion of the pier and on the undeveloped areas of the eastern portion, follows the natural topography with flow towards Lake Calumet. Precipitation falling on waste management areas and outdoor loading/unloading areas is collected by secondary systems designed to prevent run-off from impacting Lake Calumet (Ref. 3).

There are no surface water bodies, streams or wetland areas located on the Site. Significant surface water features in the vicinity of the Site include Lake Calumet, several smaller wetland areas and a storm water detention ditch (Refs. 7 and 17).

The climate in the Site area is continental with cold winters and warm summers. The average daily temperature is 51.4 degrees Fahrenheit (°F). The highest average daily temperature is 81 °F in August, and the lowest average daily temperature is 20.3 °F in December. Mean annual precipitation is 33.34 inches. Mean annual lake evaporation is 32 inches and net annual precipitation is 1.34 inches. The 1-year, 24-hour rainfall is approximately 2.5 inches. The prevailing average wind direction is southerly at a velocity of less than 13 miles per hour (Ref. 12).

2.2.1 Site Geology

The Site lies in the physiographic area known as the Chicago Lake Plain, which was at one time the bottom of glacial Lake Chicago. Lake Chicago was formed from melt waters of the Wisconsinian glaciers approximately 13,500 years ago. As Lake Chicago receded it deposited fine silt and clays on the lake bottom (Ref. 10).

The uppermost deposits in the Lake Calumet area are silts and clays of the Carmi Member of the Equality Formation. The Carmi deposits are largely lake sediments, predominantly well bedded silt, locally laminated and containing thin beds of clay. Occasional lenses of sand and gravel are also encountered in some areas. The Wadsworth Till Member, which consists of hard to very hard silty clays and clayey silts, underlies the Equality Formation. The thickness of the Wadsworth Till is variable and depends mostly on existing bedrock topography. Below the Wadsworth Till Member lies approximately 45 feet of the Lemont Drift which consists of yellow-gray silty till and sand and gravel. Underlying the Lemont Drift, approximately 90 feet below the surface, is the Silurian dolomite of the Niagaran and Alexandrian Series. The Silurian dolomites reach a maximum thickness of nearly 500 feet in the area.

Ground water in the Lake Calumet area is found in four aquifers including 1) the sand and gravel deposits of the glacial drift; 2) shallow Silurian dolomite; 3) Cambrian-Ordovician aquifer; and 4) Mt. Simon sandstone (Ref. 10).

2.2.2 Site Soils

Soil borings completed at the Site in 1991 to determine the physical properties of the soil show that the pier was constructed of miscellaneous fill material to a depth of 18.5 to 23.0 feet below ground surface (bgs). The fill material consists primarily of cinder, sand, silt, clay and organics. The fill materials were underlain by tough to very tough, gray silty clay soils that extended to the maximum depth of the borings, 35 feet bgs. Ground water at the Site was encountered at a depth of 5.0 feet to 20.0 feet bgs during the 1991 drilling operations (Refs. 3, 13, 14 and 18).

In January and February 1995, CEI completed 60 soil borings to depths ranging from 6 to 30 feet bgs at the Site (See the RFI Phase I Report for detailed information regarding these soil boring and sampling activities). Soil borings were emplaced over the entire property to characterize the soils at the facility as well as to collect samples for environmental analysis. Ground water was generally encountered at depths ranging from 2.5 to 13.5 feet bgs. CEI conducted several of the borings at a 45 degree angle to collect soil samples from beneath previously identified SWMUs.

The geology along the eastern part of the Site generally consisted of the following: Approximately 0 to 0.5 feet of topsoil was encountered covering 0 to 6 feet of fill material. This fill material consisted of construction debris much different than the fill material encountered in the western part of the property. This fill material was dominantly dark brown silty sandy clays with scattered bricks and wood. Beneath the fill was silty clays, silts and/or sand units which varied in thickness from 0 to 8 feet. Below these units and extending to the maximum depth of the borings in this part of the Site, was a stiff gray silty clay, similar to the gray silty clay encountered along the western part of the property. Ground water on this part of the property was generally encountered, if at all, at depths ranging from 8 to 14.5 feet bgs.

2.3 Facility History

Prior to the construction of the Cal-Sag Canal in the late-1920s, Lake Calumet extended beyond its current boundaries. The canal and associated flood control systems allowed for some draining and land reclamation in the area. Most of the area surrounding the Site remained under water until the early-1960s when a railroad was constructed along the eastern shore of Lake Calumet. The earthen pier currently occupied by the Site was fabricated of fill material in the early-1970s (Ref. 5).

International Hydronics Corporation (also known as Hyon Corporation (Hyon)) began operations at the Site soon after its construction in the early-1970s. Hyon reportedly occupied the Site property as well as the property to the north, a separate operational area also currently occupied by Clean Harbors. This adjacent site was previously operated by Chemical Waste Management (CWM). Hyon reportedly used the subject Site for the treatment, storage and disposal (in lagoons) of hazardous and nonhazardous wastes. The lagoons were reportedly filled with pickle liquor waste and stabilized with lime slurry to produce a sludge. These operations were conducted on approximately the eastern two-thirds of the Site. The western one-third of the Site was reportedly filled in with stabilized acid-lime sludge which was excavated from the lagoons (Ref. 11). Hyon ceased operations at the Site in approximately 1976 with Envirotherm taking over operations until 1980. Information and documentation available to CEI regarding Envirotherm's activities at the Site was limited. However, supporting documents indicate that there were no major physical changes to the Site during Envirotherm's tenure.

In October 1980, IEPA granted a permit (Permit No. 1980-36-DE) to Chem Clear, Inc. (Chem Clear) to develop a waste management facility at the Site. In November 1980, Chem Clear submitted a RCRA Part A permit application (Part A) to the US EPA. According to the Part A, the facility accepted and pre-treated hazardous and nonhazardous industrial waste water prior to discharge to the municipal sewer system. Chem Clear submitted a RCRA Part B permit (Part B) application to the IEPA in February 1983 and revisions were submitted by its successor Clean Harbors in September 1990, February 1991, December 1992 and April 1994. Clean Harbors took over operations and has occupied the Site since approximately 1989.

Detailed background information on the Site and procedures used in conducting Phase I of the RFI are found in the RFI Phase I Work Plan and RFI Phase I Report.

2.4 Current Facility Operations

The facility currently accepts for treatment a broad range of inorganic hazardous and nonhazardous waste water, including acids, alkalines and oxidizers, from a wide variety of industrial generators. The waste water accepted for treatment at the facility is characteristically hazardous; therefore it can be rendered nonhazardous through treatment. The majority of the waste treated at the Site is discharged as nonhazardous waste water to the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) sewer system. Roughly 10 percent of the treated waste ends up as nonhazardous sludge which is disposed of in a nonhazardous waste landfill.

The facility currently treats one listed hazardous waste, waste code K062. Although de-watered sludge from most listed wastes cannot typically, by law, be rendered nonhazardous, the sludge which results from the treatment of K062 can, by a special exemption in Federal regulations, be rendered nonhazardous if it is lime stabilized. This exemption allows the facility to treat K062 wastes along with other characteristically hazardous wastes, which are also rendered nonhazardous (Ref. 3).

The facility currently accepts for storage and transfer (without treatment) a wide variety of containerized hazardous and special wastes, which is sent to off-site disposal facilities. Some of this storage and transfer waste, which includes laboratory packs, is consolidated prior to shipment.

Clean Harbors proposed expansion of the facility will not lead to the addition of waste categories. However, some of the wastes that are currently accepted for storage and transfer only may be treated at the facility. The facility does not accept explosive or radioactive waste, and does not plan to do so in the future.

In fall 1993, the US EPA and the IEPA granted a final RCRA Part B permit to the facility for its existing and proposed operations. The RCRA Part B permit covers the existing and proposed activities at the Site with the exception of the existing characteristic waste water treatment process. This process is regulated under the Clean Water Act.

2.5 RFI SWMUs and AOCs

The typical evaluation process for the RFI is designed to identify releases from specific sources or SWMUs. However, the SWMUs at this facility do not readily conform to this approach because many of the SWMUs are historical and their exact locations, wastes managed and previous remediation efforts (if any) are not well documented. In addition, several of the SWMUs identified were located indoors and described processes rather than hazardous waste management units. In response to the foregoing issues, IEPA representatives established a revised list of 18 SWMUs and actions which should be conducted during the Phase I of the RFI for each SWMU (Ref. 8). CEI carried out these actions as described in the RFI Phase I Report. In accordance with IEPA's January 31, 1996 letter, several of the SWMUs have been grouped into two Areas of Concern (AOCs) (Ref. 7). Table One and Figure Two identify the RFI SWMUs and AOCs.
A list of the RFI SWMUs and AOCs is provided below:

SOLID WASTE MANAGEMENT UNITS (SWMUs)

7. Chlorobenzene Contaminated Area
8. Auxiliary Basin No. 3
9. Landfill
10. Former Temporary Pickle Liquor Basins
11. Former Permanent Pickle Liquor Disposal Sites
12 Former Permanent Pickle Liquor Basins
13. Former Oil Basin
15. Oil Contaminated Storage Area
16. Tanks 1-4

Areas of Concern (AOCs)

1. Northern Portion of Process Building No. 1 (SWMUs 2, 4 and 5)
2. Southern Portion of Process Building No. 1 (SWMUs 1, 3, 6, 14, 17 and 18)

Sections 3.1 and 3.2 of this Work Plan contains additional information regarding each of the SWMUs and AOCs.

TABLE ONE
RFI SWMUs and AOCs
RCRA Facility Investigation
Clean Harbors of Chicago, Inc.
11800 South Stony Island Avenue
Chicago, Illinois

Current RFI SWMU or AOC	Contaminants Detected	Former RFI SWMU
SWMU 7 - Chlorobenzene Contaminated Area	VOCs, Acids, Metals, BNs (PNAs)	NOT APPLICABLE
SWMU 8 - Auxiliary Basin No. 3	VOCs, Acids, BNs	
SWMU 9 - Landfill	PCBs, VOCs, Acids, BNs, Pb (TCLP and Total)	
SWMU 10 - Former Temporary Pickle Liquor Basins	BNs, Chromium (TCLP and Total)	
SWMU 11 - Former Permanent Pickle Liquor Disposal Sites	VOCs, BNs	
SWMU 12 - Former Permanent Pickle Liquor Basins	VOCs, Acids	
SWMU 13 - Former Oil Basin	VOCs, Acids	
SWMU 15 - Oil Contaminated Storage Area	N/A	
SWMU 16 - Tanks 1-4	VOCs (BTEX)	
AOC 1 - Northern Portion of Process Building No. 1	VOCs, PCBs	SWMU 2 - Outside Drum Storage Area No. 1
		SWMU 4 - Carbon Adsorption System Building
		SWMU 5 - Process Building No. 1
AOC 2 - Southern Portion of Process Building No.1	VOCs, Acids	SWMU 1 - Process Sewer System
		SWMU 3 - Outside Drum Storage Area No. 2
		SWMU 6 - Process Building No. 2
		SWMU 14 - Former Lime Basin
		SWMU 17 - 7,000 Gallon Concrete Receiving Tanks
		SWMU 18 - Truck Unloading Pad

3.0 NATURE AND EXTENT OF CONTAMINATION

3.1 RFI SWMU Evaluation

The purpose of this section is to provide available information including location, boundaries, construction, types and quantities of wastes managed, utilization history and the extent of known contamination associated with each of the nine RFI SWMUs. Figure Two identifies the SWMUs.

3.1.1 Chlorobenzene Contaminated Area (SWMU 7)

Previous investigations at the Site identified an area containing significant levels of chlorobenzene. The contaminated area is located on the eastern portion of the Site just north of the Former Permanent Pickle Liquor Basins (SWMU 12) (See Figure Two). The chlorobenzene was encountered at depths greater than 4 feet bgs and was restricted to an approximately 7,500 square foot area (Ref. 15). Information regarding the cause and level of contamination was not available at the time of this Work Plan.

Soil samples collected during Phase I of the RFI from 3 soil borings (B-58 through B-60) located in the vicinity of this unit contained VOCs, Acids, Metals and polynuclear aromatic hydrocarbons (PNAs) at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs and Acids appear to be present at elevated concentrations across the entire unit. Therefore, CEI proposes emplacing 4 to 8 additional soil borings in this SWMU and submitting 4 to 8 soil samples to a laboratory for VOC and Acid analysis.

Because Metals were detected in only one of the soil borings located within this unit (B-59), CEI proposes emplacing 1 to 2 additional soil borings in the vicinity of boring B-59 and submitting 1 to 3 soil samples to a laboratory for TCLP and Total Metal analysis.

Because PNAs were only detected in one of the soil borings located within this unit (B-60), CEI proposes emplacing 1 to 2 additional soil borings in the vicinity of boring B-60 and submitting 1 to 3 soil samples to a laboratory for BN analysis.

3.1.2 Auxiliary Basin No. 3 (SWMU 8)

This unit is located on the western portion of the site, just east of the Landfill (SWMU 9) (See Figure Two). The unit was reportedly used by Hyon for the storage of waste water, storm water, incinerator scrubber water, partially neutralized pickle liquor and oily wastes. The unit was used from approximately 1973 to 1979 and was backfilled sometime between 1979 and 1981. The type of fill material is unknown, but may have been sludge from the neutralizing of pickle liquor. Although the unit was constructed below grade to allow for freeboard, it did not contain release controls such as a liner and/or berm (Ref. 9). The area where this unit was located is currently covered with vegetation.

During Phase I of the RFI, 6 soil borings were emplaced in this unit (B-11 through B-16). Soil samples collected from 4 of the 6 borings (B-13, B-14, B-15 and B-16) contained VOCs, BNs and Acids at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Additional investigation is not required in the southwestern portion of this unit (near borings B-11 and B-12) during this phase of the RFI.

Because Acids were detected in only one of the soil borings located within this unit (B-13), CEI proposes emplacing 2 to 3 additional soil borings in the vicinity of boring B-13 and submitting 2 to 6 soil samples to a laboratory for Acid analysis.

Based on the results of the RFI Phase I, VOCs and BNs appear to be present at elevated concentrations in several locations across the entire unit. Therefore, CEI proposes emplacing 6 to 8 additional soil borings in this SWMU and submitting 6 to 8 soil samples to a laboratory for BN and VOC analysis.

3.1.3 Landfill (SWMU 9)

This unit is located on the western portion of the Site, just west of Auxiliary Basin No. 3 (SWMU 8) (See Figure Two). The Landfill was reportedly filled-in to construct the west end of the pier and dispose of neutralized pickle liquor sludge and demolition debris. The unit was used from the early-1970s to approximately 1980. There were no known release controls associated with this unit. The wastes were reportedly never excavated/removed from this unit. The area where this unit was located is currently covered with vegetation.

Soil samples collected during Phase I of the RFI from 10 soil borings (B-01 through B-10) within the vicinity of this unit contained several types of contaminants detected at high enough levels to warrant additional investigation including polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), base/neutral extractables (BNs), acid extractables (Acids) and TCLP (toxicity characteristic leaching procedure) and total lead (Pb). In addition, an organic sludge layer was encountered in a number of borings emplaced in this unit. It appears as if this sludge layer is present beneath a significant portion of the Landfill.

Proposed Soil Sampling Activities

Due to the size of this unit and the variability in the location and types of constituents detected, the entire unit will be investigated during this phase of the RFI. However, the locations of soil samples and type of analyses conducted will be based on the results of the RFI Phase I.

Because PCBs were detected in only one of the soil borings located within this unit (B-07), CEI proposes emplacing 1 to 3 additional soil borings in the vicinity of boring B-07 and submitting 2 to 4 soil samples to a laboratory for PCB analysis.

The VOC and Acid contamination appears to be confined to the eastern portion of this unit (B-08, B-09 and B-10). Therefore, CEI proposes emplacing 4 to 6 additional soil borings in this area and submitting 4 to 8 soil samples to a laboratory for VOC and Acid analysis.

Based on the results of the RFI Phase I, BNs and Pb appear to be present at elevated concentrations across the entire unit. Therefore, CEI proposes emplacing 6 to 10 additional soil borings in this SWMU and submitting 6 to 12 soil samples to a laboratory for BN and TCLP and Total Pb analysis.

In addition, CEI will attempt to delineate the extent and nature of the organic sludge layer identified during the RFI Phase I.

3.1.4 Former Temporary Pickle Liquor Basins (SWMU 10)

This unit is located near the center of the Site east of Auxiliary Basin No. 3 (SWMU 8) and west of the Former Oil Basins (SWMU 13) (See Figure Two). The unit consisted of two basins each with a reported capacity of approximately 500,000 gallons. The unit was reportedly used in 1973 to neutralize pickle liquor (sulfuric acid and iron sulfate) with lime, resulting in a calcium sulfate and iron oxide sludge. The sludge was reportedly used to backfill the Landfill (SWMU 1). Although the unit was constructed below grade to allow for freeboard, it did not contain release controls such as a liner and/or berm. The area where this unit was formerly located is covered with vegetation and an asphalt road.

Soil samples collected during Phase I of the RFI from 4 soil borings (B-17 through B-20) located within this unit contained BNs and Metals (specifically chromium) at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, BNs appear to be present at elevated concentrations across the entire unit. Therefore, CEI proposes emplacing 4 to 8 additional soil borings in this SWMU and submitting 4 to 10 soil samples to a laboratory for BN analysis.

Chromium was detected in only one of the soil borings located within this unit (B-18). Therefore, CEI proposes collecting additional soil samples from the vicinity of boring B-18 and submitting 2 to 4 soil samples to a laboratory for both TCLP and total chromium analysis.

3.1.5 Former Permanent Pickle Liquor Disposal Sites (SWMU 11)

This unit is located on the eastern portion of the Site, on the south side of the current employee parking area. The unit consisted of an area (approximately 350 feet by 275 feet) used to neutralize pickle liquor with lime resulting in a calcium sulfate and iron oxide sludge. This unit was used from 1972 to 1973. There were no known release controls associated with this unit. The area where this unit was formerly located is partially covered with asphalt from the employee parking area and partially covered with grass.

Soil samples collected during Phase I of the RFI from 3 soil borings (B-21, B-22 and B-52) located in the vicinity of this unit contained VOCs and BNs at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs and BNs appear to be present at varying concentrations across the entire unit. Therefore, CEI proposes emplacing 3 to 6 additional soil borings in this SWMU and submitting 3 to 8 soil samples to a laboratory for VOC and BN analysis.

3.1.6 Former Permanent Pickle Liquor Basins (SWMU 12)

This unit was located on the eastern portion of the property just west of the Former Permanent Pickle Liquor Disposal Sites (SWMU 11). This unit consisted of an approximately 150 foot by 30 foot area with a lime liner to an unknown depth. The unit was used to neutralize pickle liquor with lime resulting in a calcium sulfate and iron oxide sludge. The sludge was applied to on-site roads and/or the Landfill (SWMU

9). This unit was used from approximately 1973 to 1979. With the exception of the lime liner, there were no release controls associated with this unit. The area where this unit was formerly located is currently occupied by a concrete truck staging pad.

Soil samples collected during Phase I of the RFI from 4 soil borings (B-53 through B-55 and B-57) located in the vicinity of this unit contained VOCs and Acids at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs and Acids appear to be present at elevated concentrations in the vicinity of boring B-57 only. Therefore, CEI proposes emplacing 2 to 3 additional soil borings in this SWMU and submitting 2 to 3 soil samples to a laboratory for VOC and Acid analysis. Because this area is currently covered with a concrete truck staging pad, CEI proposes emplacing two of the borings at 45° angles to allow for the collection of samples from underneath the concrete pad.

3.1.7 Former Oil Basin (SWMU 13)

This unit is located near the center of the Site, just east of the Former Temporary Pickle Liquor Basins (SWMU 10) and just west of Tanks 1-4 (SWMU 16) (See Figure Two). The unit consisted of an area (approximately 250 feet by 250 feet) which contained a lime liner and a two-foot berm on three sides. This unit was used to store an oil/water mixture from a Mobil Oil spill. The unit was first used in approximately 1972 and was mostly filled-in by 1973. Information regarding the type of backfill was not available. Waste oil stored in this unit was reportedly applied to on-site roads.

Soil samples collected during Phase I of the RFI from 4 soil borings (B-37, and B-49 through B-51) located within this unit contained VOCs and Acids at high enough levels to warrant additional investigation (Note: Boring B-37 was emplaced at a 45 degree (°) angle to also allow for the collection of samples under Tanks 1-4 (SWMU 16)).

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs and Acids appear to be present at elevated concentrations across the entire unit. Therefore, CEI proposes emplacing 4 to 8 additional soil borings in this SWMU and submitting 4 to 8 soil samples to a laboratory for VOC and Acid analysis.

3.1.8 Oil Contaminated Storage Area (SWMU 15)

This unit was located outside near the southeast portion of the Site and consisted of a

50 foot by 20 foot gravel pad used for the emergency storage of three 20-cubic-yard roll-off boxes containing oil-contaminated soil and clean-up equipment. The roll-off boxes were reportedly stored in this area for approximately one month prior to off-site disposal. With the exception of the gravel pad, there were no release controls associated with this unit. The area where this unit was formerly located is currently covered with grass.

Soil samples collected during Phase I of the RFI from 1 soil boring (B-56) located in this unit did not contain contaminants at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

In accordance with IEPA's January 31, 1996, letter, no further action is required for this SWMU (Ref. 7).

3.1.9 Tanks 1-4 (SWMU 16)

This unit is located outside on the west side of the Northern Portion of Process Building No. 1 (AOC 1) and consists of four closed-topped steel tanks with inner surface coatings. The tanks are supported by 12-inch thick reinforced concrete foundations and are surrounded by an earthen diked area with a PVC liner. The diked area has a capacity of approximately 465,000 gallons (See Figure Two). The units have been used since approximately 1981. The capacity and use of each tank follows:

> Tank No. 1 - 188,500-gallons: Used for the storage of nonhazardous process effluent prior to discharge to the MWRDGC via the Process Sewer System.
>
> Tank No. 2 - 212,000-gallons: Used primarily for storage and settling of untreated wastes from the 7,000-gallon Concrete Receiving Tanks. The solids from the settling process are pumped into Tank No. 3 and the remaining material is pumped into Tank No. 4.
>
> Tank No. 3 - 212,000-gallons: Used for the storage of treated waste materials including solids from Tank No. 2. Wastes from this tank are pumped through the waste water treatment building or the 7,000-gallon Concrete Receiving Tanks.
>
> Tank No. 4 - 424,000-gallons: Used in conjunction with Tank No. 2 for the storage of any untreated wastes that are accepted for treatment at the facility. Wastes from this tank are pumped through the waste water treatment system in Process Building No. 1.

Soil samples collected during Phase I of the RFI from 4 soil borings (B-35 through B-38) located within this unit contained VOCs (specifically benzene, toluene, ethylbenzene and xylene (BTEX)) compounds at high enough levels to warrant additional investigation. These borings were conducted at 45° angles to allow for the collection of samples under the unit.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs appear to be present at elevated concentrations under the entire unit. Therefore, CEI proposes emplacing 4 to 8 additional soil borings in this SWMU and submitting 4 to 12 soil samples to a laboratory for VOC analysis. Approximately six of these borings will be conducted at 45° angles to allow for the collection of samples from under the unit.

3.2 RFI AOC Evaluation

The purpose of this section is to provide available information including location, boundaries, construction, types and quantities of wastes managed, utilization history and the extent of known contamination associated with each of the two RFI Areas of Concern (AOCs). The AOCs include several SWMUs identified in the RFI Phase I Work Plan and the RFI Phase I Report. The SWMUs have been grouped together into two AOCs due to the relative proximity of the units and the similarity of the hazardous constituents identified during initial soil sampling activities.

3.2.1 Northern Portion of Process Building No. 1 (AOC 1)

This AOC contains the following SWMUs: the northern portion of Process Building No. 1 (SWMU 5); Outside Drum Storage Area No. 1 (SWMU 2) and the Carbon Adsorption System Building (SWMU 4). See Figure Two for AOC locations. A description of each of these SWMUs is provided below.

Process Building No. 1 (SWMU 5), the waste water treatment building, contains a concrete floor with two in-ground concrete trenches, a floor sump, four manholes and three sub-surface terra-cotta pipelines. The building contains a total of approximately 13,400 square feet, approximately 3,400 of which is occupied by laboratory space. An integrity inspection was conducted on the building in July 1994 to determine the potential for past or future releases. According to the Integrity Inspection/Evaluation Report, prepared by an independent registered PE, with the exception of some surficial/hairline cracks, the building, concrete floor, floor sump, trenches, manholes and pipelines have structural integrity.

Outside Drum Storage Area No. 1 (SWMU 2) was located outside on the north side of Process Building No. 1 (SWMU 5) and consisted of a gravel pad with no secondary containment features. This unit was reportedly used to store 55-gallon drums containing any type of waste that could be accepted for treatment at the facility between 1981 and 1984 (Ref. 9). These wastes reportedly included dusts and sludges from the iron and steel industry; spent pickle liquor; electroplating waste; waste water treatment sludges from the chemical conversion coating of aluminum; inorganic pigment wastes; metal heat treating wastes; corrosive metal cleaning washes and stripping baths; ink formulation wastes; coking operations wastes; waste from the cleaning and washing of tanks; and nonhazardous wastes from the flushing of coolant systems and related equipment.

Carbon Adsorption System Building (SWMU 4) consists of an approximately 360 square foot building west of Process Building No. 1 (SWMU 5). The building contains concrete block walls and a concrete floor with a 36 inch by 36 inch collection sump 30 inches deep. The building contains the carbon adsorption system used for the collection and condensation of air from Tanks 1-4 (SWMU 16). The system generates water and solvent; the water is pumped into the 7,000-gallon Concrete Receiving Tanks and the solvent is collected in a 55-gallon drum and stored in the flammable drum storage area. An integrity inspection was conducted on the building in July 1994 to determine the potential for past or future releases. According to the Integrity Inspection/Evaluation Report, prepared by an independent registered PE, the concrete collection sump did not contain any surficial flaws or cracks. One hairline crack, approximately 4 feet long, was identified near the center of the building.

Soil samples collected during Phase I of the RFI from 5 soil borings (B-29, B-30, B-31, B-39 and B-42) within the vicinity of this AOC contained PCBs and VOCs at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, PCBs and VOCs appear to be present at varying concentrations throughout this entire AOC. Therefore, CEI proposes emplacing 6 to 10 additional soil borings in this AOC and submitting 6 to 14 soil samples to a laboratory for PCB and VOC analysis. Four of these borings will be conducted at a 45° angle to allow for the collection of samples from under Process Building No. 1.

3.2.2 Southern Portion of Process Building No. 1 (AOC 2)

This AOC contains the following SWMUs: the southern portion of Process Building No. 1 (SWMU 5); Process Sewer System (SWMU 1); Outside Drum Storage Area No. 2 (SWMU 3); Process Building No. 1 (SWMU 6); Former Lime Basin (SWMU 14);

7,000-Gallon Concrete Receiving Tanks (SWMU 17) and the Truck Unloading Pad (SWMU 18). See Figure Two for AOC locations. A description of each of these SWMUs is provided below.

Process Building No. 1 (SWMU 5), the waste water treatment building, contains a concrete floor with two in-ground concrete trenches, a floor sump, four manholes and three sub-surface terra-cotta pipelines. The building contains a total of approximately 13,400 square feet, approximately 3,400 of which is occupied by laboratory space. An integrity inspection was conducted on the building in July 1994 to determine the potential for past or future releases. According to the Integrity Inspection/Evaluation Report, prepared by an independent registered PE, with the exception of some surficial/hairline cracks, the building, concrete floor, floor sump, trenches, manholes and pipelines have structural integrity.

Process Sewer System (SWMU 1) was constructed in approximately 1981 and consists of a ductile cast iron 8-inch force main sewer line located below ground. The sewer line extends from the southwest corner of Process Building No. 1 (SWMU 5) to Stony Island Avenue where it intercepts a common sewer system. The sewer system ultimately discharges to the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) sewer system which discharges to the POTW for treatment. The unit is used to discharge nonhazardous treated waste water to the MWRDGC. The effluent from this unit is monitored daily by the MWRDGC with an on-site monitoring station.

Outside Drum Storage Area No. 2 (SWMU 3) is located outside on the south side of Process Building No. 1 (SWMU 5) just west of the 7,000-gallon Concrete Receiving Tanks. The unit consisted of a concrete pad with a 225-gallon concrete collection sump located on the west side of the pad. This unit was used to store 55-gallon drums containing any type of waste that could be accepted for treatment at the facility between 1984 and 1990. These waste reportedly included spent pickle liquor from metal finishing operations; corrosive metal cleaning washes and stripping baths; waste from the cleaning and washing of tanks and equipment; nonhazardous wastes from the flushing of coolant systems and nonhazardous waste water from cleaning tanks, floors and equipment. This unit has not been used to store wastes since the new drum storage areas in Process Building No. 2 began operating in 1990. Although there are no documented releases associated with this unit, several cracks were observed in the concrete pad.

Process Building No. 2 (SWMU 6) was constructed in the late-1980s and occupies approximately 4,580 square feet. The building is used primarily for storage of 55-gallon drums containing hazardous waste. The building has concrete floors with 1/4" epoxy coating and polyurethane sealant and silicone caulking at the expansion joints.

The floor slopes towards a trench in the drum storage area. The trench is about 9 inches wide and varies in depth from about 4 inches to 11 inches. There is also a 36 inch by 36 inch concrete sump located near the northeast corner of the building. According to the Integrity Inspection/Evaluation Report, prepared by an independent registered PE, cracks/flaws identified in Process Building No. 2 include a 48 inch hairline crack in the concrete floor, a 1 inch chip in the epoxy coating and poor caulking of a structural containment divider located between two cells in the drum storage area. The remainder of the building including the concrete floor, sump and trench were determined to have structural integrity.

Former Lime Basin (SWMU 14) was located on the eastern portion of the Site, just east of Process Building No. 1 (SWMU 5). According to available information, this unit was used for the storage of lime used to neutralize pickle liquor on site. This area was also used, at least once, for the storage of pickle liquor. The location, size, capacity and years of operation for this unit are unknown. There were no release controls associated with this unit. The general area where this unit was formerly located is covered by an asphalt driveway/parking area.

7,000-Gallon Concrete Receiving Tanks (SWMU 17) is located outside on the south side of Process Building No. 1 (SWMU 5) and consists of four 7,000-gallon in-ground concrete receiving tanks and associated secondary containment structures (sumps). The tanks were constructed in 1980 and have a vinyl ester liner; the tanks were re-lined in 1988. The unit also contains a 20 mil PVC liner as secondary containment barrier. Off-site wastes are pumped into this unit and analyzed prior to treatment in Process Building No. 1. According to the Integrity Inspection/Evaluation Report, prepared by an independent registered PE, each of the tanks contained various surficial flaws in the epoxy coating including hairline cracks, chips and areas with thin coating. With the exception of these surficial flaws, this unit was determined to have structural integrity.

Truck Unloading Pad (SWMU 18) is located on the south side of Process Building No. 1, just south of the 7,000-gallon Concrete Receiving Tanks and consists of a 48 foot by 36 foot concrete pad. Incoming tank trucks park on the concrete pad while unloading wastes into the 7,000-gallon Concrete Receiving Tanks. The pad slopes towards a 225-gallon concrete sump for the collection of any spills. There is no berm or secondary containment structures associated with this unit.

Soil samples collected during Phase I of the RFI from 12 soil borings (B-29, B-32, B-33, B-34, B-35, B-40, B-43, B-44, B-45, B-46, B-47 and B-48) within the vicinity of this AOC contained VOCs and Acids at high enough levels to warrant additional investigation.

Proposed Soil Sampling Activities

Based on the results of the RFI Phase I, VOCs and Acids appear to be present at elevated concentrations throughout this entire AOC. Therefore, CEI proposes emplacing 10 to 12 additional soil borings in this AOC and submitting 10 to 16 soil samples to a laboratory for VOC and Acid analysis. Five of these borings will be conducted at a 45° angle to allow for the collection of samples from under facility structures.

4.0 SITE-SPECIFIC SAMPLING PLAN

The Site-Specific Sampling Plan (Sampling Plan) for the Combined Phase II/III RFI has been developed to determine the nature and extent of contamination identified at various SWMUs and AOCs during Phase I of the RFI. Because soil contamination was detected at or below depths where ground water was first encountered at the site, a limited ground water screening investigation will also be implemented during this phase of the RFI. The purpose of the ground water investigation is to determine the nature of contamination, if any, present in ground water both on-site and off-site.

This plan takes into account Site specific characteristics, current operations, past operations, environmental setting and surrounding land use (as described in Sections 2.0 through 2.5 of this Work Plan). Additional background information regarding the site, surrounding areas and potential receptors is contained in the RFI Phase I Work Plan and the RFI Phase I Report. Depending upon the results of this combined Phase II/III RFI, it may be necessary to perform sampling and analysis of water and/or sediments from Lake Calumet (adjacent to the site).

Phase II of this investigation will include emplacing soil borings and collecting soil samples to determine the nature and potential extent of contamination identified during Phase I of the RFI. The sampling locations and parameters have been developed to obtain data regarding the SWMUs and AOCs as well as other potential sources of contamination including off-site sources, historical operations and potentially contaminated materials contained in the fill. The nine SWMUs and two AOCs are described in Sections 3.1 and 3.2 of this Work Plan and identified on Figure Two-Location of RFI SWMUs and AOCs.

Phase III of this investigation will include emplacing ground water monitoring wells and collecting ground water samples (via the monitoring wells and well points) to define the nature of releases to both on-site and off-site ground water, if any.

4.1 Preliminary Activities

Prior to conducting field activities, all personnel involved with the project will be trained in general and Site-specific health and safety procedures as well as quality assurance and quality control procedures.

Field personnel will survey the Site to locate proposed boring and monitoring well locations. Figure Three identifies the proposed soil and ground water sampling locations at the Site. An underground utilities locating service will be contacted to identify natural gas, electrical, cable, telephone and other underground utilities in the areas to be drilled.

4.2 Soil Sampling Locations

CEI proposes emplacing between 58 and 97 boreholes across the Site. The approximate location and number of borings have been selected based upon the contaminants identified during Phase I of the RFI and potential off-site sources (the Paxton Landfill, Land & Lakes Landfill, etc.). However, the exact placement of the boreholes will be depend upon field observations and physical constraints and will be chosen during field activities. The SWMUs and AOCs and approximate number of borings for each unit is provided below. See Figure Three (Proposed Sampling Locations) for the location of these borings.

SOLID WASTE MANAGEMENT UNITS		NUMBER OF SOIL BORINGS
7.	Chlorobenzene Contaminated Area	6 - 12
8.	Auxiliary Basin No. 3	8 - 11
9.	Landfill	11 - 19
10.	Former Temporary Pickle Liquor Basins	4 - 8
11.	Former Permanent Pickle Liquor Disposal Sites	3 - 6
12.	Former Permanent Pickle Liquor Basins	2 - 3
13.	Former Oil Basin	4 - 8
15.	Oil Contaminated Storage Area	0
16.	Tanks 1-4	4 - 8

Areas of Concern (AOCs)		NUMBER OF SOIL BORINGS
1.	Northern Portion of Process Building No. 1	6 - 10
2.	Southern Portion of Process Building No. 1	10 - 12

Five of the soil borings identified above will be converted to ground water monitoring wells and six of the borings will be utilized to collect ground water samples via temporary well points. Ground water sampling activities are described in detail in Section 4.3 of this Work Plan.

Background information regarding each SWMU and AOC, as well as rationale for the proposed soil sampling activities, is included in Sections 3.1 and 3.2 of this report.

The sampling activities defined in this Sampling Plan are designed to determine the nature and extent of soil contamination identified during Phase I of the RFI.

4.3 Ground Water Sampling Locations

CEI proposes emplacing approximately eight monitoring wells around the perimeter of the site. Five of the proposed monitoring wells will be converted from boreholes associated with the proposed soil sampling activities for specific SWMUs and/or AOCs (See Figure Three - Proposed Sampling Locations). Three additional monitoring wells will be placed around the perimeter of the eastern portion of the site. In addition, approximately six ground water samples will be collected, via temporary well points, from boreholes associated with proposed soil sampling activities.

The approximate number and location of proposed monitoring wells and ground water samples has been selected to determine the nature of contamination, if any, present in both on-site and off-site ground water. However, the exact placement of the monitoring wells and boreholes (for the collection of ground water samples via temporary well points) will be dependant upon field observations and physical constraints and will be chosen during field activities. The approximate monitoring well and ground water sampling locations are described below.

Monitoring Well Locations

1) Northwest Corner of Site (northwest corner of SWMU 9 -Landfill)
2) Southwest Corner of Site (southwest corner of SWMU 9 -Landfill)
3) South Side of Site (southeast corner of SWMU 9 -Landfill)
4) North Side of Site (northwest corner of SWMU 8 -Auxiliary Basin No. 3)
5) North Side of Site (near northwest corner of SWMU 16 -Tanks 1-4)
6) South Side of Site (south of center of Drum Storage Area)
7) Southeast Corner of Site (near Stony Island Avenue and B-23)
8) Northeast Corner of Site (near Stony Island Avenue and B-25)

Temporary Well Point Locations

1) East of SWMU 10 -Former Temporary Pickle Liquor Basins (southeast of B-18)
2) Center of SWMU 13 - Former Oil Basins
3) Northeast Corner of Process Building No. 1 (AOC 1)
4) Southeast Corner of Process Building No. 1 (AOC 2)
5) Center of SWMU 7 -Chlorobenzene Contaminated Area
6) Center of SWMU 11 -Former Permanent Pickle Liquor Disposal Sites

Background information regarding each SWMU and AOC is contained in Sections 3.1 and 3.2 of this Work Plan. Additional information including rationale for the proposed soil sampling activities is also included in these Sections (3.1 and 3.2).

4.4 Soil Sampling Methodology

A drill rig equipped with hollow-stem augers will be used to advance the boreholes. All vertical boreholes will be advanced to a depth of approximately 25 feet bgs. Approximately 17 of the proposed borehole locations will be drilled at 45 degree angles in order to collect soil samples from under existing structures. The angled boreholes will be advanced approximately 30 feet. However, due to the variability of fill material, specific borehole depths will be determined during drilling activities. The boreholes will be continuously sampled using 2-foot or 5-foot long split-spoon samplers as per American Society for Testing and Materials (ASTM) methods. Each soil sample will be screened for physical evidence of contamination, staining or elevated readings on a photoionization detector (PID) or a flame-ionization detector (FID). Soil characteristics and other pertinent observations will be recorded on borehole logs. Drill augers and hollow-stem augers will be steam cleaned between holes. Split-spoon samplers will be cleaned in an alconox solution and rinsed with deionized water between samples. Auger cuttings and decontamination water will be drummed and properly disposed. The boreholes will be filled with bentonite chips and concreted at the surface.

Soil samples will be assigned alphanumeric identification numbers based on the borehole number. Upon completion of the site sampling, the samples will be shipped to a laboratory for analysis under standard chain-of-custody procedures. The sample containers will be maintained at a temperature of approximately 4°C in an insulated container.

Laboratory analysis for this project will be performed by the Clean Harbors Environmental Services, Inc. laboratory located in Braintree, Massachusetts and/or Chicago, Illinois. A description of the procedures and quality assurance activities is included in the Laboratory Quality Assurance Plan in the RFI Phase I Work Plan submitted to the IEPA in August 1994.

CEI will collect up to 13 samples from each of the 25-foot boreholes for potential laboratory analysis. Based on the field screening, up to two samples per borehole will be immediately submitted for laboratory analysis. The remaining soil samples will be retained in case they are needed in the future for possible laboratory analysis. Any additional laboratory analysis must be performed within 14 days of the sample collection date.

In order to check the quality of the data obtained from field sampling and analytical efforts, CEI will collect one duplicate sample for approximately every 10 samples collected. The duplicate samples will be analyzed for the same parameters as the other sample collected from the specific location.

4.5 Ground Water Sampling Methodology

In order to determine if the near-surface ground water at the site has been impacted, eight boreholes will be converted into ground water monitoring wells. In addition, temporary well points will be installed into six additional boreholes at the site (See

Figure Three - Proposed Sampling Locations). The approximate location and number of monitoring wells and ground water samples has been selected to determine the nature of contamination, if any, present in both on-site and off-site ground water. See Section 4.3 of this report for additional information regarding ground water sampling locations.

All well casing materials will be steamed clean prior to installation. The wells will be set at a depth of 25 feet with the lower 15 feet consisting of No. 10 continuous screened stainless steel and the upper 10 feet consisting of solid schedule 40 PVC. Quartz sand will be placed around the screen to an elevation of 1 to 2 feet above the screen. A bentonite seal will then be placed above the quartz sand to provide an impermeable seal in the borehole. In order to secure the wells, a locking stick-up well protector will be cemented around the top of each well. Bentonite chips will be used to fill the void between the bentonite seal and the bottom of the well protector.

Approximately 48 hours after installation, each ground water monitoring well will be developed using a stainless steel bailer or a purge pump. Once the wells are developed, a minimum of three well volumes will be removed and a sample from each well will be collected using a stainless steel bailer. The ground water samples will be placed into clean 40 mL glass vials with teflon-lined septa for VOCs and amber glass bottles with teflon-lined lids for Acids, BNs and PCB analysis. Plastic bottles will be used for Metal analysis. The bailer will be steam-cleaned or cleaned with an alconox solution and triple rinsed with distilled water prior to each use. Decontamination and development water will be drummed and properly disposed.

Ground water samples will be assigned alphanumeric identification numbers based on the monitoring well number. Upon completion of the site sampling, the samples will be shipped to a laboratory for analysis under standard chain-of-custody procedures. The sample containers will be maintained at a temperature of approximately 4°C in an insulated container.

Laboratory analysis for this project will be performed by the Clean Harbors Environmental Services, Inc. laboratory located in Braintree, Massachusetts and/or Chicago, Illinois. A description of the procedures and quality assurance activities is included in the Laboratory Quality Assurance Plan in the RFI Phase I Work Plan submitted to the IEPA in August 1994.

In order to check the quality of the data obtained from field sampling and analytical efforts, CEI will collect field blanks, trip blanks and QA/QC duplicate samples. The duplicate samples will be analyzed for the same parameters as the other sample collected from the specific location.

Using a Kern GK 2-A Automatic Universal Level transit and a YSI TCL-3000 conductivity meter CEI will obtain well elevations and static ground water levels.

These values will be used to determine the direction of near surface groundwater flow across the site at the time of the sampling event.

4.6 Analytical Parameters

Due to the variety and uncertainty of the types of wastes managed at the Site in the past, samples collected during Phase I of the RFI were analyzed for EPA Priority Pollutants and barium. Analytical results indicated that several constituents were present at high enough levels to warrant additional investigation at several SWMUs and AOCs. A description of the type of contamination identified at each SWMU and AOC is included in Sections 3.1 and 3.2 of this report; these sections also describe sampling parameters for this Phase of the RFI.

All soil samples will be analyzed using the U.S. Environmental Protection Agency's (EPA) Test Methods for Evaluating Solid Wastes, Third Edition, (SW-846) for one or several of the following parameters: volatile organic compounds (VOCs) using EPA Method 8260 by GC/MS; polychlorinated biphenyls (PCBs) using EPA Method 8080; acid-base neutral extractables (Acids, BNs) using EPA Method 8270; priority pollutant metals by toxicity characteristic leaching procedure (PP-TCLP) using EPA Methods 1311, Series 7000; total priority pollutant metals using EPA method 6010, Series 7000; chromium (total and by TCLP) using EPA Method 6010; and lead (total and by TCLP) using EPA Methods 7421 (TCLP) and 6010 (total).

All ground water samples will be analyzed for the 35 Ill. Adm. Code Part 724, Appendix I constituents.

5.0 PROJECT MANAGEMENT PLAN

This Project Management Plan contains a summary and discussion of the approach and objectives for conducting the RFI at the Clean Harbors of Chicago, Inc. facility. This submittal highlights the objectives for the Combined Phase II/III RFI. This plan also includes a general discussion of the schedule and estimated budget for conducting the RFI. The qualifications of the key personnel are also included in this Work Plan.

5.1 Phase II/III RFI Objectives

The objectives of the RFI Combined Phase II/III are to determine the nature and potential extent of soil contamination identified during Phase I of the RFI and to determine the nature of releases, if any, to both on-site and off-site ground water. The Work Plan takes into account Site characteristics, past and present operations, surrounding land use and environmental setting. If ground water contamination is found at the facility, the nature and extent of contamination will be investigated in subsequent phases of the RFI. If necessary, the results of the RFI will be used to develop a Corrective Action Plan (CAP) which describes the necessary actions required to protect human health and the environment from releases of hazardous wastes or constituents from the facility.

5.2 Phase II/III Technical Approach

The overall strategy for conducting the RFI activities is based on a site-wide, multi-phased approach. Phase I RFI activities included a review of available historical information regarding the Site and surrounding properties. Current operations and waste management activities at the Site and surrounding properties were also assessed. Phase I activities also included emplacing 60 soil borings and collecting samples of fill material across the Site. The results of the Phase I sampling indicated that the site has been impacted with a variety of contaminants at varying depths. Near surface ground water was encountered in the majority of the Phase I borings at depths ranging from 2.5 to 14.5 bgs.

Phase II of the RFI will include emplacing between 58 and 97 boreholes across the site. Soil samples from each borehole will be analyzed for constituents of concern identified during Phase I of the RFI and the January 31, 1996 letter from the IEPA to Clean Harbors (Ref. 7).

Phase III of the RFI will include a limited ground water screening program to determine the nature of contamination, if any, present in ground water at the site. Phase III will include installing approximately 8 monitoring wells around the perimeter of the site (several of which are associated with specific SWMUs or AOCs). In addition, approximately 6 ground water samples will be collected, via temporary well points, from boreholes associated with proposed soil sampling activities.

Ground water samples from monitoring wells and temporary well points will be submitted to a laboratory for 35 Ill. Adm. Code Part 724, Appendix I constituents.

5.3 Phase II/III Schedule of Tasks

Subsequent to IEPA approval of this Work Plan, Phase II/III activities at the Site will be initiated. The schedule to complete Phase II/III of the RFI is outlined in Table Two. As shown in this table, Phase II/III of the RFI is expected to take approximately 32 weeks to complete. It should be noted, however, that the estimate may change based on IEPA comments.

5.4 Phase II/III Estimated Budget

The estimated budget for the Phase II/III RFI includes the following activities:

- **Completion/Submittal of the RFI Phase II/III Work Plan**

  Includes CEI's time and materials to complete the Phase II/III Work Plan for submittal to the IEPA.

- **Start-up Activities (Fieldwork Preparation)**

  Includes time necessary to contact the analytical laboratory and drilling company to schedule time and equipment required for the project and arrange for the required supplies to be delivered. Utilities will be contacted and allowed time to identify underground services at the Site. City and state agencies will be contacted to obtain authorization and/or permits required to conduct the proposed activities at the Site.

- **Fieldwork**

  Includes time to locate appropriate sampling and monitoring well locations, time on-site for soil sampling, well development, ground water sampling, surveying, time to package and send samples to the laboratory and travel time. This estimate assumes approximately 35 to 45 days of field activities.

- **Drilling Services and Equipment**

  Includes mobilization charges, use of the drill rig and labor cost for 30 to 40

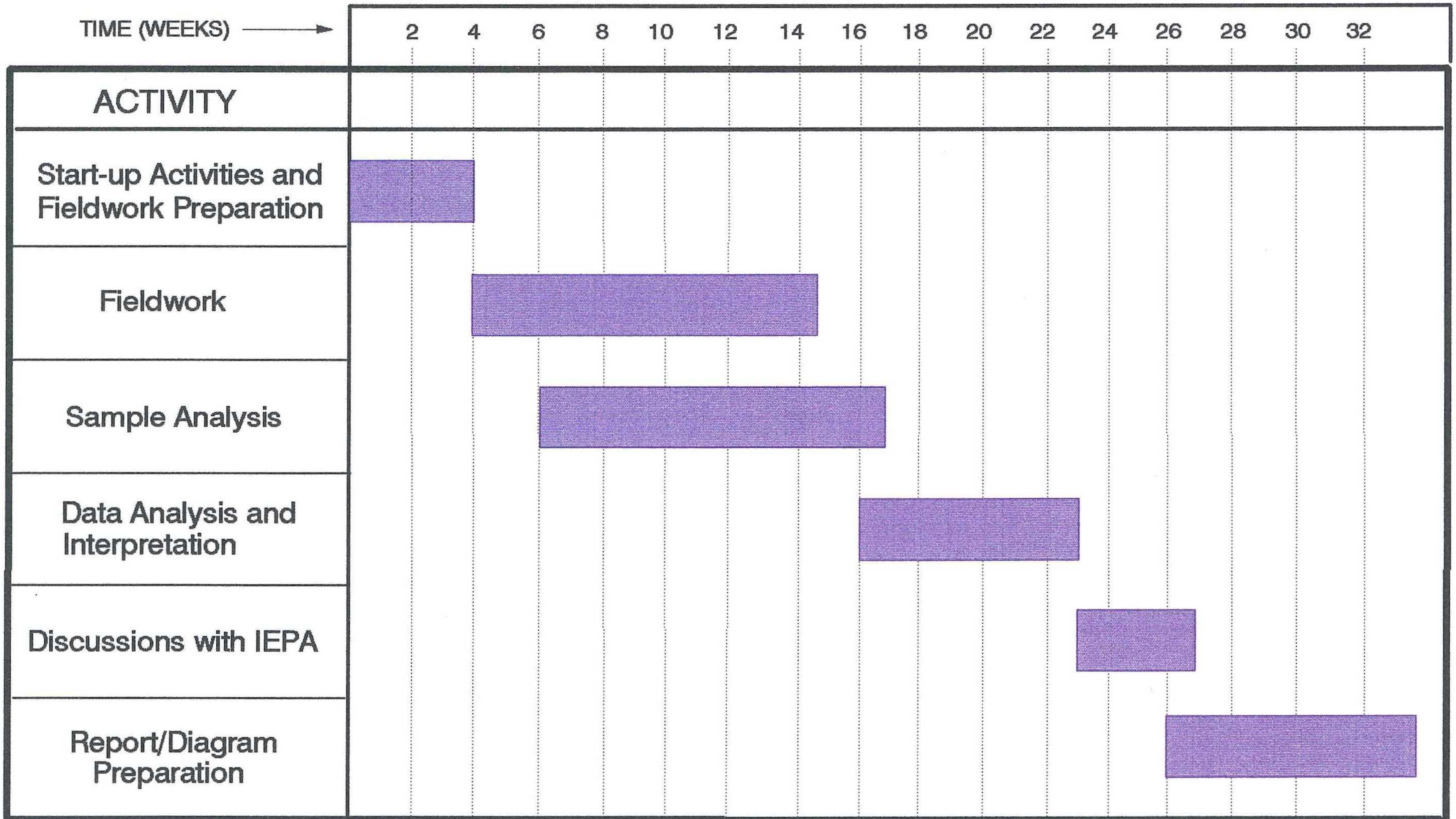


TABLE TWO

COMBINED PHASE II/III RFI - ESTIMATED SCHEDULE OF TASKS

CLEAN HARBORS OF CHICAGO, INC. FACILITY

days. This cost also includes drilling supplies such as bentonite chips, sand, concrete, well and well point materials, and 55-gallon drums for auger cuttings, decontamination water and development water.

- **Sample Analysis**

Includes analytical costs for 115 to 231 soil samples. All soil samples will be analyzed using the U.S. Environmental Protection Agency's (EPA) Test Methods for Evaluating Solid Wastes, Third Edition, (SW-846) for one or several of the following parameters: volatile organic compounds (VOCs) using EPA Method 8260 by GC/MS; polychlorinated biphenyls (PCBs) using EPA Method 8080; acid-base neutral extractables (Acids, BNs) using EPA Method 8270; priority pollutant metals by toxicity characteristic leaching procedure (PP-TCLP) using EPA Methods 1311, Series 7000; total priority pollutant metals using EPA method 6010, Series 7000; chromium (total and by TCLP) using EPA Method 6010; and lead (total and by TCLP) using EPA Methods 7421 (TCLP) and 6010 (total).

Includes the cost of analysis of 14 ground water samples for the 35 Ill. Adm. Code Part 724, Appendix I constituents.

Note: These costs are based on the assumption that the laboratory will be responsible for providing sample jars.

- **Sample Shipping Costs**

Includes the costs for daily overnight delivery of laboratory samples from the Site to the analytical laboratory.

- **Site Survey**

Includes time on site to survey soil boring and monitoring well locations and generate CAD drawings.

- **Report/Diagram Preparation**

Includes time to analyze/interpret data, prepare reports, soil boring logs, generate CAD drawings and review written drafts.

- **Project Management**

Consists of the management and coordination of day-to-day work; oversight of project tasks; discussion/correspondence with IEPA and monitoring of budgets.

ESTIMATED COST FOR EACH ACTIVITY

□	Completion/Submittal of RFI Phase II/III Work Plan	$ 10,000
□	Start-up Activities (Fieldwork Preparation)	$ 4,650
□	Fieldwork	$ 51,000 - 66,000
□	Equipment and Materials	$ 9,000 - 12,000
□	Drilling Services and Equipment	$ 76,200 - 91,000
□	Sample Analysis	$ 53,454 - 72,249
□	Sample Shipping Costs	$ 4,000
□	Site Survey	$ 5,500
□	Report/Diagram Preparation	$ 29,000
□	Project Management	$ 26,400
	TOTAL	**$ 269,204 - 320,799**

5.5 Phase II/III Project Personnel

CEI's project management team involved in developing the RFI Work Plan and conducting investigations at the facility includes the following individuals:

□	Project Director	Richard J. Carlson
□	Project Manager	Valerie A. Farrell
□	Project Engineer	Kenneth W. James, P.E.

Dr. Richard J. Carlson, Project Director, will have final responsibility and authority for all work performed. Dr. Carlson will assure the resources required to successfully complete the project are committed.

The Project Manager, Valerie A. Farrell, is the key manager of project activities and is responsible for:

- Managing project operations and activities.
- Conducting technical review of each task being performed.
- Maintaining clear and effective communication with Clean Harbors' Project Manager.
- Working with Clean Harbors in project scoping and planning.
- Ensuring appropriate technical resources are utilized for each task.
- Ensuring field activities are conducted in accordance with program Health and Safety and QA/QC requirements.
- Ensuring proper technical consultation is provided.
- Maintaining overall project technical continuity.
- Controlling costs and schedule aspects of all project activities.

The project Engineer, Kenneth W. James, will be responsible for maintaining the quality of all engineering activities associated with the project in addition to establishing detailed task specifications including schedules and estimates of labor and material costs.

Project Staff will include the following CEI personnel:

- Edward E. Garske, Chemist
- Peter E. Barys, Hydrogeologist
- Margaret M. Kilian, Engineer
- Samuel T. Bodine, Staff Scientist
- Bruce A. Shabino, Staff Geologist
- Phillip A. Hoeksema, Staff Geologist

The qualifications of the above listed CEI personnel are included in Attachment A.

6.0 QUALITY ASSURANCE PROJECT PLAN

CEI prepared a Quality Assurance Project Plan (QAPP) for the Combined Phase II/III RFI at the Clean Harbors of Chicago, Inc. facility to fulfill a requirement of the RCRA Hazardous Waste Management Part B permit. The QAPP presents the organization, policies, QA/QC procedures, objectives and activities that will be utilized to ensure the data provided as a result of the RFI at the facility are representative of Site conditions. The QAPP is designed to meet the data quality goals of the RFI.

Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analyses are described in the QAPP. The QA/QC procedures are structured in accordance with applicable technical standards, US EPA's requirements, regulations and guidance. This QAPP was prepared largely in accordance with a guidance manual entitled "Region 5 Model RCRA Quality Assurance Project Plan", May 1993.

The QAPP is included in Attachment B.

7.0 HEALTH AND SAFETY PLAN

It is the policy of CEI and Clean Harbors to provide a safe work environment for all their employees. No phase of operations or administration is of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts.

The Site Health and Safety Plan (SHSP) prepared for Combined Phase II/III of the RFI at the Clean Harbors of Chicago, Inc., facility prescribes the procedures that must be followed by all site personnel while on the project Site. Operational changes which could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of Clean Harbors, the CEI Project Manager and the CEI health and safety personnel.

The provisions of this plan are mandatory to all CEI personnel and subcontractors assigned to the project. CEI requires all visitors to any of the work sites to abide by these procedures. Work conditions can change as operations progress. The Health and Safety Manager will provide written addenda to this SHSP when changes warrant. No changes to the plans will be implemented without prior approval of the Health and Safety Manager or his authorized representative.

The Health and Safety Plan is included in Attachment C.

8.0 REFERENCES

Ref. 1. Carlson Environmental, Inc., February 1994. Environmental Assessment Report: Clean Harbors of Chicago, Inc.

Ref. 2. Charles Bartholomew Engineering, Inc., May 1984. Subsurface Investigation and Hydrogeologic Report - Proposed Expansion Land & Lakes Landfill, Chicago, Illinois.

Ref. 3. Clean Harbors of Chicago, Inc., September 1993. RCRA Hazardous Waste Management Part B Permit, September 30, 1993, modified effective August 5, 1995.

Ref. 4. Dames & Moore, January 1994. Chemical Waste Management (CWM) Chemical Services, Inc., Final RCRA Facility Investigation Report - Chicago Incinerator Facility.

Ref. 5. Geonex, Inc., 1949, 1958, 1963, 1970, 1979, 1982, 1986, 1988 and 1992. Aerial Photographs - Township 37 North, Range 14 East Sections 23 and 24.

Ref. 6. Hey & Associates, Inc., November 1993. Wetland and Wildlife Assessment: Clean Harbors of Chicago, Inc. Facility

Ref. 7. Illinois Environmental Protection Agency (IEPA), January 31, 1996. Letter prepared by Mr. Edwin C. Bakowski, Manager of Permit Section, Bureau of Land, regarding additional activities at the site and the RFI SWMUs and AOCs.

Ref. 8. IEPA, January 1994. Letter prepared by Mr. Lawrence Eastep, Division of Land Pollution Control - Permit Section, regarding the RFI SWMUs.

Ref. 9. IEPA, April 1991. RCRA Facility Assessment - Clean Harbors of Chicago, Inc.

Ref. 10. IEPA, April 1994. The Southeast Chicago Study: An Assessment of Environmental Pollution and Public Health Impacts, Springfield, Illinois.

Ref. 11. International Hydronics Corporation, September 1970. Supplemental Technical Report - Ultimate Waste Disposal Facility.

REFERENCES (Continued)

Ref. 12. National Oceanic and Atmospheric Administration, 1990. Local Climatological Data -O'Hare International Airport, Chicago, Illinois.

Ref. 13. O'Brien & Associates, Inc., May 1991. Subsurface Investigation for the Proposed Development - Clean Harbors of Chicago, Inc.

Ref. 14. Professional Service Industries, Inc., June 1990. Soils Exploration and Foundation Recommendations for the Proposed Storage Building - Clean Harbors of Chicago, Inc.

Ref. 15. Samsel Services Company, 1987. Report of Sediment Sampling at Chem-Clear's Lake Calumet Facility, Chicago, Illinois.

Ref. 16. United States Geological Survey 7.5 Minute Series Topographic Map, Lake Calumet Quadrangle, 1965, photorevised 1973 and photoinspected 1977.

Ref. 17. United States Department of the Interior, 1983. National Wetlands Inventory Map, Lake Calumet Quadrangle.

Ref. 18. Walter H. Flood & Company, Inc., April 1981. Soil Investigation - 120th Street and Paxton Avenue Vicinity, Chicago, Illinois.

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT A

CEI Statement of Qualifications

312 West Randolph Street • Chicago, Illinois 60606 • (312) 346-2140

CARLSON ENVIRONMENTAL, Inc.

RICHARD J. CARLSON

EDUCATION

Doctor of Philosophy, Public Administration, University of Illinois
Master of Science, Communications, University of Illinois
Bachelor of Science, Communications, University of Illinois

PROFESSIONAL EXPERIENCE

President, Carlson Environmental, Inc., 1988-Present

- Represents clients in negotiating permits, compliance orders and consent decrees with state and federal regulatory agencies.

- Manages environmental compliance audits and assists with the development of compliance management systems.

- Manages environmental assessments of a wide variety of commercial and industrial facilities for real estate transactions, mergers, and acquisitions.

Director, Illinois Environmental Protection Agency, 1981-1988

Administered programs under Superfund, the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act and the Safe Drinking Water Act. As Director:

- Initiated the state's first hazardous waste site cleanup program.

- Managed the development and implementation of a statewide ground water protection program based upon the concept of well head protection.

- Served as co-chairman of a task force to improve emergency preparedness planning in the chemical industry.

- Managed a Federal/State program of financial assistance to local government for construction or upgrading of wastewater treatment facilities; annual grant expenditures averaged $260 million.

- Developed a demonstration program for mobile incineration at hazardous waste cleanup sites utilizing rotary kiln technology.

Assistant to Governor James R. Thompson, 1977-1981

Served as policy advisor to the Governor for energy, environmental and other natural resource issues. Responsibilities included program coordination of seven state agencies; coordinating preparation of the Governors's legislative program; advising the Governor on whether to sign or veto legislation.

Prepared reorganization plans creating the Departments of Energy and Natural Resources, Commerce and Community Affairs, and Administrative Services.

Director of Research, Council of State Governments, 1974-1977

Research Director for a non-profit agency promoting intergovernmental cooperation among the 50 state governments.

SELECTED PROFESSIONAL ACTIVITIES

- Co-chair, Environmental Control Committee, Chicagoland Chamber of Commerce, 1988-1993.
- Staff Chairman, Task Force on Global Climate Change, National Governors' Association, 1989-1990.
- Director, Illinois Asbestos Abatement Authority, 1988.
- Commissioner, Ohio River Valley Water Sanitation Commission, 1981-1988.
- Member, Water Quality Board, International Joint Commission, 1985-1988.
- Chairman, Great Lakes Environmental Administrators, 1987-1988.

PROFESSIONAL AFFILIATIONS

- Air and Waste Management Association
- Association of Ground Water Scientists and Engineers

DIRECTORSHIPS

Continental Waste Industries, Inc.

CARLSON ENVIRONMENTAL, Inc.

EDWARD E. GARSKE

EDUCATION

Bachelor of Science, Water Chemistry, College of Natural Resources, University of Wisconsin

REGISTRATIONS / CERTIFICATIONS

Certified Hazardous Materials Manager-Master Level (Institute of Hazardous Materials Management).

Accredited to conduct building inspections under the provisions of the Asbestos Hazard Emergency Response Act (Midwest Environmental and Industrial Health Training Center, University of Illinois, Chicago).

PROFESSIONAL EXPERIENCE

Vice President of Operations, Carlson Environmental, Inc., 1989-Present

Manages projects involving the design and implementation of ground water monitoring systems and soil/sediment sampling programs. Supervises underground storage tank removals, including the remediation of contaminated soils and groundwater. Conducts environmental site assessments. Provides oversight for a wide range of remedial action projects.

Has managed projects involving building inspections to identify and sample asbestos-containing building materials (ACBM), quantify ACBM, prepare bid documents, assist in contractor selection and oversee project management.

Superfund Technical Assistance Team, Roy F. Weston, Inc., 1988-1989

Under the Superfund contract to the USEPA (Region V), conducted assessments of suspected hazardous waste sites, including abandoned plating facilities, landfills and surface impoundments. Performed air monitoring, sampling and lab packing. Specialized in soil gas analysis to determine extent of contaminated ground water plumes. Prepared cost projections for removal actions and arranged for transportation and disposal of contaminated materials.

Research Scientist, Amoco Chemicals Research Center, 1986-1988

Performed research in catalyst screening and development. Specialized in research and development of new co-polymers. Assisted in the construction and operation of a pilot plant to study ethylene oxidation.

Aquatic Organic Chemist, Illinois State Water Survey, 1980-1986

Supervised and instructed laboratory personnel in field operations and various field/laboratory analyses. Designed and implemented a variety of ground water monitoring programs. Projects included the evaluation of various types of ground water sampling devices to determine their impact on water chemistry.

PUBLICATIONS

Co-author, "An Inexpensive Flow-Through Cell and Measurement System for Monitoring Chemical Parameters in Ground Water," Ground Water Monitoring Review, 6,3, p. 79-84.

Co-author, "Practical Guide for Ground Water Sampling," Contract report to RSKERL-USEPA, Ada, OK, February 1985.

Co-author, "Sampling Tubing Effect on Ground Water Samples," Analytical Chemistry, February 1985.

Co-author, "A Laboratory Evaluation of Ground Water Sampling Mechanisms," Ground Water Monitoring Review, 4,2, p. 32-41.

Co-author, "Nitric Oxide Interference on the Azide-Modified Winkler Oxygen Determination," Analytical Chemistry, May 1985

Patent: Flow-Through Cell for Monitoring Ground Water Samples.

CARLSON ENVIRONMENTAL, Inc.

KENNETH W. JAMES

EDUCATION

Master of Business Administration, University of Chicago
Bachelor of Science, Chemical Engineering, Illinois Institute of Technology

REGISTRATIONS / CERTIFICATIONS

Registered Professional Engineer, Illinois, Indiana and Wisconsin.

PROFESSIONAL EXPERIENCE

Director of Engineering, Carlson Environmental Inc., 1991-Present

Manages underground storage tank investigations, tank removals and remediation of contaminated soils and groundwater. Manages leaking underground storage tank (LUST) Site Classifications and prepares associated Illinois Environmental Protection Agency (IEPA) documentation. Designs and implements soil sampling and ground water monitoring programs. Manages the preparation of documentation required by the IEPA for the reimbursement of funds spent to remediate LUST sites. Provides professional engineering oversight for TSCA decontamination activities, RCRA Remedial Facility Investigations and RCRA closures. Prepares operating permits for the Clean Air Act Permit Program.

Marketing Manager, R.O.C. Services, 1989-1991

Developed and implemented marketing strategies for delivery of information systems to promote quality assurance, project management and applications' development for clients in education, manufacturing, government and public utilities.

Manager, Northern Illinois Gas Company, 1973-1989

As Construction Manager of Ni-Gas' Eastern Operating Division, planned and implemented additions to the Eastern Operating Division's physical distribution system. Directed a staff of 47 and managed $8 million capital budget.

As Plant Manager of Ni-Gas' Synthetic Natural Gas (SNG) Plant, managed all facets of plant operations; supervised staff of 60 and $9 million annual budget. Implemented facility shutdown plan.

As Maintenance Manager of the SNG Plant, was responsible for maximizing production capacity through effective equipment maintenance and repair activities.

As Operations Manager of the SNG Plant, was responsible for maximizing production capacity through effective equipment maintenance and repair activities; supervised staff of 30 with $3 million annual budget.

Professional Affiliations

- National Society of Professional Engineers
- Illinois Society of Professional Engineers
- American Institute of Chemical Engineers
- Association of Ground Water Scientists and Engineers

CARLSON ENVIRONMENTAL, Inc.

VALERIE A. FARRELL

EDUCATION

Master of Environmental Management, Illinois Institute of Technology (in progress)
Bachelor of Science, Loyola University of Chicago

CONTINUING EDUCATION

Completed "Ground-Water Monitoring and Sampling Technology: Design, Installation, Development, and Sampling of Ground-Water Monitoring Wells" course through the American Society for Testing and Materials.

Completed "Conducting Historical Research According to ASTM Standard E 1527-94."

REGISTRATIONS/CERTIFICATIONS

Certified Hazardous Materials Manager (CHMM), Institute of Hazardous Materials Management

Accredited to conduct building inspections under the provisions of the Asbestos Hazard Emergency Response Act.

PROFESSIONAL EXPERIENCE

Site Assessment Manager/Project Manager, Carlson Environmental, Inc., 1993-Present

Manages a wide variety of hazardous waste projects including RCRA closures and corrective actions. Coordinates and conducts environmental assessments conducted for real estate transactions. Manages the preparation of environmental permit applications. Performs Phase II Environmental Assessment soil and groundwater sampling activities.

Staff Scientist, Dynamac Corporation, 1991-1993

Managed remedial investigation/feasibility studies (RI/FS) in accordance with CERCLA guidance. Conducted compliance field work under RCRA guidelines. Also conducted hazardous waste contamination investigations.

Directed numerous preliminary assessments and visual site inspections of former RCRA TSD facilities in US EPA Region V. Assessments included analysis of facility operations; waste generating processes; waste handling practices; regulatory history and compliance status; identification of potential releases and recommendations.

Provided technical oversight of Potentially Responsible Party (PRP) removal actions in accordance with Administrative Orders. Additional activities included review of technical documents, QA/QC, Health & Safety, and material transportation procedures.

Assistant Unit Manager, Ecology and Environment, Inc., 1990-1991

Assisted in supervising a group. Responsible for tracking project progress, reviewing technical reports, and training new employees. Coordinated many phases of pre-remedial investigations of potentially hazardous waste sites. CERCLA pre-remedial investigation responsibilities included: State and Federal file reviews; PRP interviews; work plan, sampling plan, and Health & Safety plan preparation; soil sampling; interpretation of chemical analysis and results; assessment of contamination and receptors; report preparation; HRS and Revised HRS scoring package preparation.

CARLSON ENVIRONMENTAL, Inc.

MARGARET M. KILIAN

EDUCATION

Master of Science, Environmental Engineering, Illinois Institute of Technology (In progress)
Bachelor of Science, Chemical Engineering, Michigan State University

CONTINUING EDUCATION

Completed "Monitoring Well Technology: Design, Installation and Sampling" course through the Department of Engineering at the University of Wisconsin - Madison College of Engineering.

REGISTRATIONS/CERTIFICATIONS

Professional Engineer Intern (EIT), Illinois

Accredited to conduct building inspections under the provisions of the Asbestos Hazard Emergency Response Act as amended by the Asbestos School Hazard Abatement Reauthorization Act (Midwest Environmental and Industrial Health Training Center, School of Public Health, University of Illinois, Chicago).

PROFESSIONAL EXPERIENCE

Environmental Engineer, Carlson Environmental, Inc., 1992-Present

Designs and manages soil and ground water sampling programs. Oversees underground storage tank (UST) removals. Conducts UST related soil and ground water investigations. Prepares reports documenting UST removals and associated remediation activities for submittal to appropriate state agencies. Performs indoor air quality evaluations. Prepares permit applications for waste water and storm water discharges and air pollution control applications.

PROFESSIONAL AFFILIATIONS

- Association of Groundwater Scientists and Engineers

CARLSON ENVIRONMENTAL, Inc.

PETER E. BARYS

EDUCATION

Master of Science, Geology, Southern Illinois University
Bachelor of Arts, Geology, Augustana College

PROFESSIONAL EXPERIENCE

Project Manager, Carlson Environmental, Inc., 1994-Present

Designs and implements soil and ground water investigation programs. Manages underground storage tank investigations, tank removals and remediation of contaminated soils. Conducts site classifications for LUST sites and prepares associated IEPA documentation.

Project Geologist, Tower Environmental, Inc., 1993-1994

Managed projects involving the investigation and remediation of soil and ground water contamination related to underground storage tank systems. Developed and implemented project plans, including scheduling and management of field personnel, data evaluation and completion of contamination assessment reports for State review and approval.

Staff Geologist, Harding Lawson Associates, 1991-1993

Responsible for managing and directing all phases of environmental projects (RCRA, CERCLA and UST removals) including budgeting, data collection, reporting and client communication. Provided training of field personnel and evaluated equipment purchases.

Research Assistant/Teaching Assistant, Southern Illinois University, 1985-1987

Participated in geologic research in conjunction with the fossil fuel / sedimentology departments. Teaching assistant for earth science, historical geology, and other geology classes.

Geologist/Technician, Soil and Material Consultants, Inc., 1985-1987

Classified soils in the field and laboratory, tested physical characteristics of road construction materials and supervised contractors in the preparation of soil for development purposes.

CARLSON ENVIRONMENTAL, Inc.

SAMUEL T. BODINE III

EDUCATION

Bachelor of Arts, Environmental Studies, Lake Forest College

CONTINUING EDUCATION

Completed "Ground-Water Monitoring and Sampling Technology: Design, Installation, Development, and Sampling of Ground-Water Monitoring Wells" course through the American Society for Testing and Materials.

Completed "Risk-Based Corrective Action (RBCA) Training" course through the Department of Engineering at the University of Wisconsin - Madison College of Engineering.

REGISTRATIONS/CERTIFICATIONS

Accredited to conduct building inspections under the provisions of the Asbestos Hazard Emergency Response Act.

Accredited Site Assessor by the Department of Industry, Labor and Human Relations in the State of Wisconsin.

PROFESSIONAL EXPERIENCE

Environmental Scientist, Carlson Environmental, Inc., 1994-Present

Conducts Phase I environmental assessments and building inspections for asbestos-containing building materials. Performs Phase II Environmental Assessment soil and groundwater sampling activities. Conducts site classifications for LUST sites and prepares associated IEPA documentation. Prepares permit applications for waste water and storm water discharges and air pollution control applications.

PROFESSIONAL AFFILIATIONS

Illinois Association of Environmental Professionals

CARLSON ENVIRONMENTAL, Inc.

BRUCE A. SHABINO

EDUCATION

Master of Science, Geology, University of Illinois-Chicago (In progress)
Bachelor of Science, Environmental Health Science, Illinois State University

REGISTRATIONS/CERTIFICATIONS

Certified Building Inspector, Management Planner, and Air Sampling Professional.

NIOSH 582 Training. Certificate of competency for sampling and evaluating airborne asbestos dust

PROFESSIONAL EXPERIENCE

Staff Geologist, Carlson Environmental, Inc., 1995-Present

Conducts hydrogeological investigations; provides project management for site remediation. Conducts Phase I environmental assessments. Manages underground storage tank (UST) removals and remediation.

Environmental Scientist, Great Lakes Group, Inc., 1993-1995

Conducted Phase I and Phase II environmental assessments. Supervised the removal of underground storage tanks (USTs) and related soil remediation programs.

Staff Environmental Scientist, Harding Lawson Associates, 1989-1992

Conducted Phase I environmental assessments, soil and groundwater surveys and remediation, and industrial hygiene surveys. Managed projects involving inspections for asbestos-containing building materials and the implementation of abatement programs.

Industrial Hygiene Technician, Caterpillar, Inc., 1989

Assisted Senior Industrial Hygienist in conducting various plant-wide environmental assessments. Assessed employee workplace exposure to contaminants.

CARLSON ENVIRONMENTAL, Inc.

PHILLIP A. HOEKSEMA

EDUCATION

Bachelor of Science, Geology, Illinois State University

PROFESSIONAL EXPERIENCE

Environmental Technician, Carlson Environmental, Inc., 1995-Present

Assists Project Managers in a variety of field work. Prepares technical data for inclusion in project reports. Prepares documentation required by the Illinois Environmental Protection Agency for the reimbursement of funds spent to remediate underground storage tank releases.

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT B

Quality Assurance Project Plan

312 West Randolph Street • Chicago, Illinois 60606 • (312) 346-2140

ATTACHMENT B
QUALITY ASSURANCE PROJECT PLAN
COMBINED PHASE II/III ACTIVITIES

Clean Harbors of Chicago, Inc.
11800 South Stony Island Avenue
Chicago, Illinois

Prepared by
CARLSON ENVIRONMENTAL, INC.
312 West Randolph Street
Suite 300
Chicago, IL 60606
(312) 346-2140

Project No. 8666
May 1996

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS (continued)

ATTACHMENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) was prepared for Clean Harbors of Chicago, Inc. (Clean Harbors), in fulfillment of a requirement under the facility's RCRA Hazardous Waste Management Part B permit. The QAPP presents the organization, policies, QA/QC procedures, objectives and activities that will be utilized to ensure the data provided as a result of a RCRA Facility Investigation (RFI) at the property are representative of Site conditions. The QAPP is designed to meet the data quality goals of the RFI.

Specific protocols for sampling, sample handling and storage, chain-of-custody procedures, and laboratory and field analyses are described in the QAPP. The QA/QC procedures are structured in accordance with applicable technical standards, requirements, regulations and guidance. This QAPP was prepared largely in accordance with the *Region 5 Model RCRA Quality Assurance Project Plan*, May 1993.

This QAPP is Attachment B to the RCRA Facility Investigation Combined Phase II/III Work Plan for the Clean Harbors of Chicago, Inc. facility (referred to as the RFI Combined Phase II/III Work Plan in this QAPP), dated May 1996.

1.1 Site Description and Background

The Clean Harbors facility (the Site) is located on the eastern shore of Lake Calumet in Chicago, Cook County, Illinois. The facility is situated on an approximately 26.5 acre earthen pier. The pier is approximately 2,500 feet long, 400 feet wide, and was constructed of fill material in the early 1970s. The western side of the property, as well as three-quarters of the northern and southern sides, are bounded by Lake Calumet. Stony Island Avenue is the eastern boundary of the Site. The Site is owned by the Illinois International Port District and the address is 11800 South Stony Island Avenue.

Buildings and equipment for the treatment, storage, consolidation and/or transport of hazardous and nonhazardous wastes, are located on the eastern portion of the Site. The western portion of the Site, approximately 13.5 acres, is currently undeveloped and is covered with heavy vegetation. The Site has been utilized as a waste treatment, storage and disposal facility since its construction in the early 1970s. More detailed information regarding the Site is provided in the facility description and figures in the RFI Phase I Work Plan, the RFI Phase I Report and the RFI Combined Phase II/III Work Plan.

Due to the variety and uncertainty of the types of wastes managed at the Site in the past sample collected during Phase I of the RFI were analyzed for EPA Priority Pollutants and barium. Analytical results identified the following constituents at high enough levels to warrant additional investigation: volatile organic compounds (VOCs); polychlorinated biphenyls (PCBs); acid-base neutral extractables (Acids, BNs); priority pollutant metals; chromium; and lead. A description of the type of contamination identified at each SWMU and AOC is included in Sections 3.1 and 3.2 of this report; these sections also describe sampling parameters for this Phase of the RFI.

1.2 Project Description

The Clean Harbors facility was issued a RCRA Hazardous Waste Management Part B permit (Part B) on September 30, 1993, modified effective August 5, 1995. According to the Part B permit, corrective action must be conducted, as necessary, to protect human health and the environment from all releases of hazardous wastes or constituents from any solid waste management unit (SWMU) at the facility. The corrective action includes conducting a RCRA Facility Investigation (RFI). The purpose of the RFI is to determine whether releases of hazardous wastes or constituents have occurred at the facility, and if so, the nature and extent of the releases. The results of the RFI will be used to develop a Corrective Action Plan (CAP) which identifies actions necessary to protect human health and the environment.

Specific field activities associated with Phase II/III of the RFI will include conducting soil borings, installing ground water monitoring wells, installing temporary well points, collecting soil samples and collecting ground water samples. Additional ground water sampling and/or sediment sampling may be conducted in later phases of the RFI. This QAPP addresses Phase the Combined II/III activities outlined in the RFI Combined Phase II/III Work Plan.

1.3 Project Objectives

The objectives of the RFI Combined Phase II/III are to determine the nature and potential extent of soil contamination identified during Phase I of the RFI and to determine the nature of releases, if any, to both on-site and off-site ground water. The Work Plan takes into account Site characteristics, past and present operations, surrounding land use and environmental setting. If ground water contamination is found at the facility, the nature and extent of contamination will be investigated in subsequent phases of the RFI. If necessary, the results of the RFI will be used to develop a Corrective Action Plan (CAP) which describes the necessary actions required to protect human health and the environment from releases of hazardous wastes or constituents from the facility.

The QAPP establishes practices and procedures to ensure that scientifically reliable data are generated during the RFI activities. The data should be technically sound, statistically valid and properly documented. The data must be of sufficient quality to allow comparison with State health-based criteria and other pertinent Federal regulatory criteria.

The following project objectives were identified for the Clean Harbors Site:

- Determine the nature and potential extent of soil contamination identified during Phase I of the RFI.
- Determine the nature of releases, if any, to both on-site and off-site ground water.
- Define potential migration pathways.
- Identify physical features and characteristics that may affect remediation activities.
- Collect sufficient information to support the conclusions of the RFI and the implementation of the Corrective Action Plan, if necessary.

The RFI Combined Phase II/III field activities will include the following:

- Installation of soil borings;
- Installation of monitoring wells;
- Installation of temporary well points;
- Soil sampling;
- Ground water sampling;
- Surveying new boring locations;
- Determination of ground water flow across the site.

Upon completion of the RFI activities, a summary of the results of the Phase II/III RFI will be prepared and submitted to the Illinois Environmental Protection Agency (IEPA) for review and comment. Data from this phase of the investigation will be qualitatively and statistically evaluated in conjunction with existing data to determine whether additional investigation is necessary. The purpose and scope of any additional investigative activities will be discussed with and approved by the IEPA prior to implementation. Work beyond the scope of Phase II/III of the RFI is not addressed by this QAPP.

1.4 Data Uses and Needs

The intended use of the data collected during Phase II/III activities is outlined below:

- Characterize the Site;
- Determine the extent of contamination identified in Site soils;
- Determine the nature of releases, if any, to both on-site and off-site ground water;
- Determine whether additional investigation is necessary to determine the vertical and horizontal extent of contamination.

1.5 Data Quality Objectives

Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during RFI activities. DQOs are based on the end uses of the data to be collected. Different data uses may require different levels of data quality.

In order to accomplish the intentions outlined in Section 1.4, a confirmational level of analytical quality is needed. This provides the highest level of data quality and includes, but is not limited to, the purposes of risk assessment, evaluation of remedial alternatives and establishing cleanup levels. These analyses require full documentation of SW 846 analytical methods, sample preparation steps, data packages and data validation procedures necessary to provide defensible data. Quality Control (QC) must be sufficient to define the precision and accuracy of these procedures at every step.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The following sections define the project team organization, personnel, duties and responsibilities. Carlson Environmental, Inc. (CEI) has been retained by Clean Harbors to manage the Site investigation. The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined below.

The following responsibilities have been assigned for the project:

□ Project Director	Richard J. Carlson, CEI
□ Project Manager	Valerie A. Farrell, CEI
□ Project Engineer	Kenneth W. James, P.E., CEI
□ Project Administrator	Jules B. Selden, Clean Harbors
□ Quality Assurance Officer	Edward E. Garske, CEI
□ Off-Site Laboratory Operations	Clean Harbors Environmental Services, Inc.
□ Site Health and Safety Manager	Valerie A. Farrell, CEI

Other CEI staff and subcontractor personnel will be utilized as needed. All CEI field personnel and subcontractors are medically monitored on an annual basis, and have completed OSHA 40 hour training and annual 8 hour refresher training, as required.

Resumes for CEI Project Personnel are included in Attachment A of the RFI Combined Phase II/III Work Plan.

2.1 Project Director

The Project Director will have overall responsibility for CEI's effort on the project. The Project Director will ensure the investigation proceeds in a time effective manner consistent with the goals of the Work Plan. The Project Director will act as lead consultant, and in addition will conduct the following activities:

- Assist the Project Manager in project planning activities.
- Attend meetings between Clean Harbors and CEI.
- Interface with the Project Manager on progress in the areas of technical activities, budget, and schedule.
- Review key project documents, including this plan.

2.2 Project Manager

The Project Manager (PM) will be the prime point of contact with Clean Harbors and will have primary responsibility for technical, financial, and scheduling matters. If significant deviations from this plan are encountered during the course of the investigation, the PM will consult with Clean Harbors personnel and obtain their approval to proceed if changes are required. The PM will conduct the following activities:

- Assign duties to the project staff and orient the staff to the needs and requirements of the project.

- Supervise project team members.

- Control the project budget and schedule.

- Review subcontractor work and approve subcontractor invoices.

- Review all reports for technical accuracy and completeness prior to submission to the State.

- Establish a project record keeping system.

- Be responsible for the preparation and quality of interim and final reports.

2.3 Project Administrator

The Project Administrator is the principal Clean Harbors contact for the RFI activities.

2.4 Quality Assurance Officer

The Quality Assurance Officer (QAO) will be responsible for ensuring that all Phase I Work Plan activities adhere to the QA/QC guidelines defined in this QAPP. This adherence is critical in order to provide acceptable/representative data.

2.5 Field Staff

The geologist or other field staff will be responsible for conducting the following activities:

- Providing direction and supervision to the drilling contractor.

- Insuring that appropriate field logs are maintained for project activities.

- Supervising the collection of all samples, and providing for their proper handling and shipping.

- Monitoring drilling and sampling operations to ensure that the drilling contractor and sampling team members adhere to the QA provisions of the plan.

- Reviewing and evaluating the analytical results.

2.6 Off-Site Laboratory Manager

The Laboratory Manager for Clean Harbors Environmental Services, is responsible for ensuring that laboratory personnel adhere to the laboratory's Quality Assurance/Quality Control (QA/QC) Plan, included as Attachment G to the RFI Phase I Work Plan.

2.7 Site Health and Safety Officer

The field activities associated with this plan will be conducted in accordance with the requirements of the project Site Health and Safety Plan (SHSP), submitted under separate cover as Attachment C to the RFI Combined Phase II/III Work Plan. CEI staff assignment for management of compliance is detailed in the SHSP.

2.8 Subcontractors

CEI will use the following subcontractor for drilling activities at the Site:

Rock & Soil Drilling Corporation
1720 East Tyler Road
St. Charles, Illinois 60174
Phone 800/232-7190

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results which are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

3.1 Precision

Precision is the degree to which two or more measurements are in agreement. Field precision is evaluated through the collection and analysis of duplicate samples at a rate of 1 duplicate per 10 analytical samples.

The precision of analytical project measurements is assessed through the calculation of relative percent difference (RPD) of duplicates or relative percent standard deviations

(RSD) of replicates. The equations used to calculate precision are provided in Section 7.5 of the Clean Harbors Laboratory QA/QC Plan, included as Attachment G to the RFI Phase I Work Plan. The precision will be evaluated and reported with the method reference number. Precision measurements will be conducted using appropriate instrumentation, high purity materials, trained laboratory personnel, internal quality controls and consistent scientific practice.

3.2 Accuracy

Accuracy is a measure of the relationship of the observed value to an accepted reference value. Field accuracy is assessed through the use of field blanks and adherence to sample handling, preservation and holding times.

Laboratory accuracy is assessed through the analysis of matrix spikes or standard reference materials and the determination of percent recoveries. The laboratory's procedure for determining accuracy is outlined in Section 7.5 of the Clean Harbors Laboratory QA/QC Plan, included as Attachment G to the RFI Phase I Work Plan.

3.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system, compared to the amount expected to be obtained given normal conditions. The data base will be evaluated on a routine basis to assess actual versus expected data, and will be developed to the point where the data base is capable of supporting statistical analysis for interpretational purposes.

The percent completeness can be calculated as follows:

$$\text{Completeness} = \frac{\text{(number of valid measurements)}}{\text{(number of measurements planned)}} \times 100$$

3.4 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition.

Representativeness in the field depends upon the adequacy of the sampling program design and will be satisfied by ensuring that the field sampling plan is followed and appropriate sampling techniques are used.

Representativeness in the laboratory is ensured by using the appropriate analytical procedures, meeting holding times, and analyzing and assessing field duplicate samples. The sampling locations were chosen in order to provide data representative of facility conditions. During development of the sampling plan, consideration was given to known past and current waste storage/disposal practices. The rationale of the sampling plan is discussed in Sections 3.1, 3.2 and 4.0 of the RFI Combined Phase II/III Work Plan.

3.5 Comparability

Comparability is the expression of confidence with which data sets can be compared with each other. Analytical data are comparable when similar sampling and analytical methods are used, with similar quality assurance objectives. Comparability will be achieved in part by citing standardized sampling and analysis methods, and utilizing standard data formats. Deviations from standard operating procedures will be noted and data will be qualified for comparative purposes.

If identified, inconsistencies within data sets or deviations from expected results will be evaluated to determine if the inconsistency is the result of sampling collection or handling procedures, analytical procedures, or unpredicted natural fluctuations. The evaluation will include a review of documentation of sample collection activities, laboratory chain-of-custody records, chromatograms and analytical procedures. If inconsistency is found to be due to sample mishandling, the sample will be duplicated for analysis if feasible.

4.0 SAMPLING PROCEDURES

4.1 Introduction

Section 4.0 describes the procedures to be used in collecting soil and ground water samples at the Site. The objective of the procedures outlined in this section is to obtain representative samples of the matrix to be tested. The procedures should eliminate the potential for contamination of the sample by external sources. This section will present the following information:

- Describe the drilling, monitoring well installation and temporary well point installation;
- Describe soil and ground water sampling methods;

- Describe the sample numbering system, storage and shipment procedures;

- Outline the procedures for documentation of field activities.

The rationale for the selection of borehole locations, monitoring well location, temporary well point locations and the number of soil and ground water samples collected at the Site is discussed in Sections 3.1, 3.2, 4.2 and 4.3 of the RFI Combined Phase II/III Work Plan.

As described in the RFI Phase Combined II/III Work Plan, the following activities will be conducted during the investigation:

- Soil borings will be installed in and around the SWMUs and AOCs and near the perimeter of the facility;

- Temporary well points will be installed in six of the soil borings;

- Monitoring wells will be installed in eight of the soil borings;

- The soil borings will be continuously sampled and logged in order to provide an indication of the composition and quality of the unconsolidated materials at the Site.

- Ground water samples will be collected from the temporary well points and ground water monitoring wells;

- Field analysis and laboratory analysis will be conducted (on soil and ground water samples) to provide an indication of the horizontal and vertical extent of impacts at the Site;

- The locations of soil borings and monitoring wells will be surveyed in order to determine ground water flow direction and allow for future placement of borings and monitoring wells on site figures;

- Duplicate samples will be collected to meet quality assurance/quality control objectives.

4.2 Soil Boring Installation and Sampling

Approximately 58 to 97 soil borings will be drilled using hollow stem auger techniques (ASTM 1452). The approximate borehole locations are shown on Figure Three in the

RFI Combined Phase II/III Work Plan. Standard penetration tests (ASTM D 1586-84) will be conducted at each sampling interval in the borings. Soil samples will be collected on a continuous basis.

A 2-inch diameter, stainless steel split spoon sampler will be used for sample collection. A 3-inch diameter, stainless steel split spoon may be used if the 2-inch split spoon cannot obtain adequate volumes for chemical analysis. The number of borings to be drilled and the estimated depth of each boring are summarized in Sections 3.1, 3.2 and 4.2 of the RFI Combined Phase II/III Work Plan. If during sampling for chemical analysis the soil volume recovered is not adequate, another sample will be attempted from immediately beneath the unsuccessful sample interval.

Augers and other downhole equipment will be steam-cleaned prior to drilling each borehole. Water generated as a result will be contained in labeled 55-gallon drums pending disposal analysis. The split-spoon sampler will be washed with a laboratory grade detergent (Alconox), rinsed with tap water and final-rinsed with distilled water between consecutive samples.

The soil sampling procedure outlined below will be used in the drilling of all soil borings:

1. Record borehole location, the project number, the project name, the borehole identification number, personnel responsible for logging the borehole, drilling method and borehole diameter, dates and times of drilling, and drilling contractor name on each borehole log.

2. Drill to the start of the designated sampling depth and obtain soil samples with a split-spoon sampler. Record the number of blow counts for each six inch interval.

The split-spoon samples will be examined in the field. The samples will be screened for evidence of contamination, such as staining or elevated readings on an organic vapor detection field instrument (either a photoionization detector (PID) or a flame-ionization detector, (FID)). The field instrument provides qualitative information regarding potential contamination levels, which assists in determining the extent of contamination at the Site and provides information for health and safety purposes.

Sample collection procedures are as follows:

1. Upon opening the split-spoon sampler, the sample will be split into containers for possible future analysis. Laboratory-prepared, clean glass sample jars with teflon-lined lids will be used to contain each sample fraction. Headspace in the

jars containing samples to be analyzed for volatile or semi-volatile organic compounds will be minimized to the extent practical.

2. A portion of the sample will be placed in a new, sealed plastic bag for headspace analysis. The sample collected in a sealable plastic bag will be allowed to equilibrate for at least ten minutes. If the ambient temperature is below 32°F, headspace development should be within a heated vehicle or building. The sample will be shaken and kneaded to release volatile compounds into the headspace of the bag. The probe of the PID or FID will then be inserted in the bag and the highest reading for the sample will be recorded on the borehole log.

3. The sample will be examined and all observations recorded on the borehole logs. The lithologic description will include information regarding soil type, grain size distribution, plasticity, color, moisture (expressed as dry, moist, wet or saturated), consistency, density, grain shape and lithology, and group symbol.

Additional information to be included on the borehole log forms includes the following:

- Difficulties encountered during drilling.
- Depth at which ground water is encountered, if applicable.
- PID or FID monitoring results.
- Depth/elevation of sampling interval.
- Depth/elevation of strata changes.
- Sample recovery.
- Standard penetration blow counts for every 6 inches, hammer weight, and length of fall.
- Total depth of completed boring.
- Depth of any grouting or sealing and the amount of cement and/or bentonite used.
- Identification numbers for samples and duplicates.

Equipment for the sampling program will include the following:

- A sufficient number of split-spoons to allow uninterrupted sampling
- Hollow stem auger drilling equipment
- Distilled and potable water
- Personal safety equipment
- PID or FID
- Sealable plastic baggies
- 55-gallon drums

For all borings, where analytical samples are to be collected, the geologist will perform the following activities:

- Use a field device, either a flame-ionization detector (FID) or a flame ionization detector (FID) to immediately measure gases volatilizing from the sample. In addition, the geologist will transfer a grab soil sample to a clean resealable plastic bag. After sealing the bag, headspace will be allowed to develop for at least ten minutes. The sample will be shaken or kneaded to promote volatilization of gases to the headspace. The sample bag will then be quickly punctured and a PID or FID sampling probe inserted. The highest meter response will be recorded as the headspace concentration.

- The analytical sample will be collected from the split spoon as soon as possible. At the same time VOA samples are obtained, additional soil will be composited and placed in appropriate sample containers as needed for the type of analysis being performed for that sample location.

- Sample containers will be placed in iced, secure storage until subsequent preparation for shipment.

4.3 Ground Water Monitoring Well Installation and Sampling

Approximately 8 soil borings will be converted into permanent monitoring wells and temporary well points will be installed in 6 additional borings. The approximate monitoring well and well point locations are shown on Figure Three in the RFI Combined Phase II/III Work Plan.

All well casing material will be steamed clean prior to installation. The wells will be set at a depth of 25 feet with the lower 15 feet consisting of No. 10 continuous screened stainless steel and the upper 10 feet consisting of solid schedule 40 PVC. Quartz sand will be placed around the screen to an elevation of 1 to 2 feet above the screen. A bentonite seal will then be placed above the quartz sand to provide an impermeable seal in the borehole. In order to secure the wells, a locking stick-up well protector will be cemented around the top of each well. Bentonite chips will be used to fill the void between the bentonite seal and the bottom of the well protector.

All sampling equipment will either be steam-cleaned or washed with a laboratory grade detergent (Alconox), rinsed with tap water and final-rinsed with distilled water between consecutive samples.

Sample collection procedures are as follows:

1. Approximately 48 hours after installation, each ground water monitoring well will be developed using a stainless steel bailer or a ground water purge pump. The development will be considered complete when three borehole volumes have been removed. Development water will be contained in 55-gallon drums.

2. The static water level was measured and recorded to 0.01 feet with an electric water level indicator (Solinist model 101). These values will be used to determine the direction of near surface ground water flow across the site at the time of the sampling event.

3. Once the wells are developed, a sample from each well will be collected using a stainless steel bailer after a minimum of three well volumes have been removed. Laboratory-prepared, clean glass/plastic sample containers with teflon-lined lids will be used to contain each sample. Headspace in the vials/jars containing samples to be analyzed for volatile or semi-volatile organic compounds will be minimized to the extent practical.

4. The sample will be examined and all observations recorded on the sample logs. The description will include information regarding color, number of layers, and the presence of sheens.

Sample containers will be placed in iced, secure storage until subsequent preparation for shipment.

Equipment for the sampling program will include the following:

- Ground water sampling pumps
- Stainless steel bailers
- Electric water level indicator
- Distilled and potable water
- Personal safety equipment
- Rope
- 40 mL glass vials with teflon-lined septa, amber glass bottles with teflon-lined lids, and plastic bottles
- Sealable plastic baggies
- 55-gallon drums

4.4 QA/QC Sampling

To check the quality of data obtained from field sampling and analytical efforts, duplicate samples will be collected for analyses. Given the relatively large volume of sample material required to fill the set of sample containers for each set of analyses, it may be necessary to collect the portions of the sample and the duplicate to be analyzed for volatile organic and semi-volatile organic compounds from one split-spoon. A sample and duplicate for the other parameters to be analyzed will be collected from the subsequent split-spoon. The duplicate samples will be treated as separate samples for identification, logging and shipping. Analytical results on the duplicates will be filed with the appropriate field sample data.

4.5 Sample Designation

An alpha-numeric system will be used to identify each sample, including duplicate samples. The first portion of the identification will consist of the letter(s) "B" for soil borings and "MW" for monitoring wells followed by a number, indicating the borehole number or monitoring well number. Each sample from a particular borehole will be labeled alphabetically. For example, the first sample collected from a depth of 1-3 feet from borehole 12 would be designated B12-A. The second sample, from 3-5 feet, would be designated B12-B. Duplicate samples taken from one split-spoon would have consecutive alphabetic numbers. Note that the chain-of-custody forms should not reflect sample depths in order to reduce the potential that the laboratory will identify duplicate samples prior to analysis.

4.6 Cuttings Disposal and Borehole Abandonment

Cuttings, development water and decontamination water will be contained in steel 55-gallon drums and placed in a central location until analytical results can be reviewed and appropriate disposal can be arranged if necessary. Drums will be labeled with the source borehole or monitoring well number. Labels will be readable up to the time of disposal.

Borehole abandonment will be as follows:

- Borings will be abandoned immediately after sampling unless saturated conditions are encountered.

- In borings where saturated conditions are encountered, a 24-hour ground water level will be measured before abandonment. Borings left open will be covered to minimize the potential for personnel injury.

- Borings will be backfilled with bentonite chips.

4.7 Sample Storage

All sample jars will have teflon-lined lids and will be provided by either Clean Harbors Environmental Services, Inc. or an equivalent facility. Each sample will be placed in labeled sample bottles, capped, and placed in sealed plastic baggies, and stored in an iced cooler at 4°C. Samples not shipped to the laboratory will be stored at Carlson Environmental, Inc., offices in a refrigerated space to maintain the temperature of the sample at 4°C. These samples will be maintained under the supervision of the Project Manager.

4.8 Documentation

A hard-cover, bound field logbook will be used to record all daily activities performed at the Site. Detailed entries will be made to allow situations to be reconstructed if necessary. The date, weather, time, personnel at the Site, visitors and the purpose of the visit, will be recorded in the logbook. The logbook will be stored securely in the office when not in use. Borehole log sheets will be completed in the field for each borehole. The logs will detail all information regarding the sampling method, the identification of the borehole, and a description of each sample collected from the borehole. The Project Manager will retain custody of these documents upon completion of the project.

Project sampling activities will be documented by keeping a written record of daily sampling activities and implementing a series of interrelated chain-of-custody procedures. This will assure the integrity of laboratory data by tracking and documenting samples from the time they are collected by the sampling team to the time they move through the laboratory.

5.0 CUSTODY PROCEDURES

Stringent documentation of custody is one of several factors that is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area.

A sample or evidence file is under custody if it is:

- in the actual possession of an individual;
- in the view of an individual after being in possession of an individual;
- in actual physical possession but is locked up to prevent tampering; or
- in a designated and identified secure area.

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain of custody intact. A copy of a chain-of-custody form is presented in Attachment A.

5.1 Field Custody

The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

Sample containers will be identified by use of sample tags with sample numbers, project name, date/time of collection, preservative, and type of analysis. The sample numbering system is presented in Section 4.5 of this QAPP. Sample tags are to be completed using waterproof ink unless prohibited by weather conditions.

Chain-of-custody forms will be completed to the full extent possible prior to shipment of samples. The form will include the following information: sample number, time collected, date collected, source of sample (including type of sample), preservative and name of sampler. The forms will be completed in a legible manner using waterproof ink and will be signed by the sampler. When transferring possession of the samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a laboratory, or to/from a secure storage area.

5.2 Transfer of Custody and Shipment

Samples will be properly packaged on ice or "blue ice" at 4°C in an insulated cooler for shipment and dispatched to the appropriate laboratory for analysis, accompanied by a signed chain-of-custody form. Shipping containers must meet applicable State and Federal standards for safe shipment. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. Custody seals will be attached to the front right and back left of the cooler. The custody seals will be covered with clear plastic tape. The cooler will be strapped with tape in at least two locations.

Samples will be transported to the laboratory by overnight carrier or directly by laboratory personnel. Bills of lading or other documentation provided by the carrier shall be retained as part of the permanent documentation. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

The original chain-of-custody record form will accompany the shipment. A copy of the form will be retained by the Project Manager.

5.3 Laboratory Custody Procedures

Laboratory custody procedures for sample receiving and log-in, sample storage and number, tracking during sample preparation and analysis, and storage of data are described in the Clean Harbors QA/QC Plan, dated June 1994. The manual is included as Attachment G to the RFI Phase I Work Plan.

6.0 EQUIPMENT CALIBRATION

6.1 Field Equipment

Field equipment, such as the Photoionization Detector (PID) or a Flame-Ionization Detector (FID), used during this field project will be calibrated and operated in accordance with the manufacturer's instructions. Copies of manuals for the equipment will be available at the Site at all times during sampling activities.

The PID and FID will be calibrated will be calibrated prior to the initiation of field activities and daily thereafter, using a commercially prepared isobutylene gas standard with a concentration of 100 ppm in air. Documentation of calibrations will be maintained in equipment logs and in field logbooks for the project.

6.2 Laboratory Equipment

Laboratory equipment will be calibrated as outlined in the Clean Harbors Environmental Services, Inc., Quality Assurance/Quality Control for Inorganic and Organic Analysis Manual, dated June 1994. The manual is included as Attachment G to the RFI Phase I Work Plan.

7.0 ANALYTICAL SERVICES

All soil samples will be analyzed using the U.S. Environmental Protection Agency's (EPA) Test Methods for Evaluating Solid Wastes, Third Edition, (SW-846) for one or several of the following parameters: volatile organic compounds (VOCs) using EPA Method 8240 by GC/MS; polychlorinated biphenyls (PCBs) using EPA Method 8080; acid-base neutral extractables (Acids, BNs) using Method 8270; priority pollutant metals by toxicity characteristic leaching procedure (PP-TCLP) using EPA Methods 1311, Series 7000; total priority pollutant metals using EPA method 6010, Series 7000; chromium (total and by TCLP) using EPA Method 6010; and lead (total and by TCLP) using EPA Methods 7421 (TCLP) and 6010 (total).

All ground water samples will be analyzed for the 35 Ill. Adm. Code Part 724, Appendix I constituents.

The quality assurance/quality control procedures utilized by the Clean Harbors laboratory are presented in the Clean Harbors Environmental Services, Inc., Quality Assurance/Quality Control for Inorganic and Organic Analysis Manual dated June 1994, included as Attachment G to the Clean Harbors RFI Phase I Work Plan. The program includes required sample handling procedures, documents the analytical procedures, outlines instrument maintenance and calibration information, details quality control for reporting analytical results, and discusses disposal of samples.

8.0 INTERNAL QUALITY CONTROL

8.1 Field Quality Control Checks

Soil samples will be analyzed in the field using either a PID or a FID. Field analyses are performed in the field and do not involve samples that are collected and retained. The quality control procedures will consist of calibrating the instruments, as outlined in Section 6.0 of this QAPP, and taking multiple readings.

Assessment of field sampling precision and bias will be made by collecting field duplicates for laboratory analysis. Collection of the duplicate samples will be in accordance with the sampling procedures outlined in Section 4.0 of this QAPP and the RFI Phase I Work Plan.

8.2 Laboratory Quality Control Checks

The laboratory identified in Section 7.0 of this QAPP has instituted a quality control program designed to ensure the reliability and validity of the analyses performed at the laboratory. The internal quality control checks include the following:

- Field duplicates
- Method blanks
- Reagent/preparation blanks (inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Analytical spikes
- Laboratory duplicates
- Laboratory control standards
- Internal standard areas for GC/MS analysis; control limits
- Mass tuning for GC/MS analysis
- Endrin/DDT degradation checks for GC/EC analysis
- Second, dissimilar column confirmation for GC/EC analysis

9.0 DATA REDUCTION, VALIDATION AND REPORTING

All data generated in field activities or in the laboratory shall be reduced and validated prior to reporting. Data reduction consists of converting raw analytical data to final results with appropriate reporting units. Data validation consists of qualifying analytical/measurement data on the performance of the field and laboratory quality control measures incorporated in the sampling and analysis procedures.

9.1 Field Data

Field data reduction procedures will be minimal. Only direct-read instrumentation will be used in the field. A PID or FID will generate measurements directly read from the instruments following calibration per manufacturer's recommendations, as outlined in Section 6.0 of this QAPP. Data will be entered onto borehole logs or in field logbooks immediately after measurements are taken. Errors will be crossed out, initialed and dated by the field member, and the correct measurement will be recorded in the space adjacent to the incorrect entry.

Field data evaluation will consist of checking to ensure transcription errors are not made when preparing final borehole logs or other documentation based on field documents. This task is the responsibility of an individual, typically the Project

Manager or Project Director (identified in Section 2.0 of this QAPP), who has not otherwise participated in making the field measurements or adding information to the field logbook.

All field data recording sheets (such as borehole logs and field logbooks) will be retained. Summarized raw data will be identified in reports.

9.2 Laboratory Data

The raw analytical data for samples collected from the Site under the RFI Combined Phase II/III Work Plan activities, will be reduced, validated, summarized and reported by the Clean Harbors laboratory. The data reduction, validation and reporting procedures are summarized in Section 15.0 of the Clean Harbors Environmental Services, Inc., Quality Assurance/Quality Control for Organic and Inorganic Analysis Manual, dated June 1994, included as Attachment G to the RFI Phase I Work Plan.

Prior to the release of the analytical data in a public document, the Quality Assurance Manager for Carlson Environmental, Inc., will review the data received from the analytical laboratory in order to confirm that the data appears to reflect expected conditions at the Site.

If the Project Manager and the Quality Assurance Manager detect unacceptable data, these individuals will initiate corrective procedures as necessary. Procedures may consist of the following:

- A reanalysis of particular samples, if allowed, based on holding time criteria;
- Collecting new samples for analysis;
- Accepting and documenting a level of uncertainty in the data.

9.3 Performance/System Audit

A performance/system audit of field activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the QAPP and the Site Health and Safety Plan.

Given the relatively short duration of the RFI Combined Phase II/III sampling activities (approximately 35 to 45 days), three field audits will be conducted by the CEI QA Officer during the sampling activities to ensure established sampling procedures are being followed. The audit will include the examination of field sampling records, field instrument operating records, sample collection, handling and packaging, etc. Follow-up audits may be conducted if serious deficiencies are noted in the initial audit.

The Clean Harbors Environmental Services, Inc. Laboratory Manager will be responsible for conducting a laboratory audit or otherwise ensuring that the laboratory adheres to QA/QC procedures documented in its QA/QC Plan.

9.4 Data Assessment

Laboratory precision, accuracy and completeness will be assessed by spiking samples in the laboratory and assessing the percent recovered. Completeness will be assessed as discussed in Section 3.3.

10.0 CORRECTIVE ACTION

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out-of-quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation and data assessment. All corrective action proposed and implemented should be documented in the regular quality assurance reports to management. Corrective action should only be implemented after approval by the CEI Project Manager or the Clean Harbors Laboratory Manager.

Any non-conformance with the established quality control procedures in the QAPP or Sampling Plan will be identified and corrected in accordance with the QAPP. The CEI Project Manager or a designee will issue a non-conformance report for each non-conformance condition.

10.1 Corrective Action in the Field

Corrective action in the field may be necessary when a sample network is changed (i.e., more/less samples, sampling locations other than those specified in the QAPP or the RFI Phase I Work Plan, etc.), or sampling procedures and/or field analytical procedures require modification, etc., due to unexpected conditions. In general, the field staff, Project Manager, or the Quality Assurance Officer may identify the need for corrective action. A corrective action will be recommended by either the field staff, the Project Manager or the Quality Assurance Officer. It is the responsibility of the Project Manager, in conjunction with the Quality Assurance Officer, to ensure the corrective action has been implemented. Corrective actions will be implemented and documented in the field logbook.

10.2 Corrective Action in the Laboratory

Laboratory corrective action may occur prior to, during and after initial analyses. A number of conditions such as broken sample containers, multiple phases, low/high pH readings, and/or potentially high concentrations samples may be identified during sample log-in or just prior to analysis. Following consultation with lab analysts, it may be necessary for the Laboratory Manager or a designee to approve the implementation of corrective action. Actions may include dilution of samples, additional extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. The corrective action will be documented in the laboratory's records and will be documented in the laboratory report sent to CEI's QA Officer. If corrective action does not rectify the situation, the laboratory will contact the CEI Project Manager.

10.3 Corrective Action During Data Validation and Assessment

The facility may identify the need for corrective action during either data validation or data assessment. Potential types of corrective action may include resampling by the field staff or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon ability to mobilize the field staff, whether the data to be collected is necessary to meet the required quality assurance objectives, etc.

11.0 QUALITY ASSURANCE REPORTS

No separate Quality Assurance report will be generated, given the short duration of the project. The report summarizing the investigation activities will contain a separate QA section discussing the quality of information collected during the project.

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT A

Sample Forms

CE

CHAIN-OF-CUST DY RECORD

No. 69

CARLSON ENVIRONMENTAL, INC. 312 W. Randolph St. Chicago, IL 60606 (312) 346-2140

PROJ. NO.	PROJECT NAME	NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)
SAMPLERS: (Signature)			

ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS									REMARKS
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	REMARKS
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	

Distribution: White - Accompanies Shipment; Yellow - Laboratory File; Pink - Coordinator Field Files

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT C

Health and Safety Plan

312 West Randolph Street • Chicago, Illinois 60606 • (312) 346-2140

CARLSON ENVIRONMENTAL, Inc.

SITE HEALTH AND SAFETY PLAN

Clean Harbors of Chicago, Inc.
11800 South Stony Island Avenue
Chicago, Illinois

Prepared by
CARLSON ENVIRONMENTAL, INC.
312 West Randolph Street
Suite 300
Chicago, IL 60606
(312) 346-2140

Project No. 8666
May 1996

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS

CARLSON ENVIRONMENTAL, Inc.

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

CARLSON ENVIRONMENTAL, Inc.

LIST OF ATTACHMENTS

CARLSON ENVIRONMENTAL, Inc.

REVIEW AND APPROVAL

PROJECT MANAGER

Carlson Environmental, Inc.

Richard J. Carlson	Date

SITE SUPERVISOR

Carlson Environmental, Inc.

Edward E. Garske	Date

HEALTH AND SAFETY OFFICER

Carlson Environmental, Inc.

Valerie A. Farrell	Date

CARLSON ENVIRONMENTAL, Inc.

SITE HEALTH AND SAFETY PLAN ACKNOWLEDGMENT

I have read, understand, and agree to abide by the provisions as detailed in this Site Health and Safety Plan prepared by CEI. Failure to comply with these provisions may lead to disciplinary action and/or my dismissal from the work site.

Printed Name	Signature	Date

CARLSON ENVIRONMENTAL, Inc.

1.0 EMERGENCY INFORMATION

1.1 PUBLIC AGENCIES

FIRE	911
AMBULANCE	911
POLICE	911
HOSPITAL	911
HOSPITAL LOCATION	SEE ATTACHMENT A

South Chicago Community Hospital
2320 East 93rd Street
Chicago, Illinois 60617 (312) 978-2000

Contact: Ms. Evette Estrada

1.2 KEY PERSONNEL

CARLSON ENVIRONMENTAL, INC.	PROJECT MANAGER
Richard J. Carlson	(312) 704-8842
CARLSON ENVIRONMENTAL, INC.	SITE SUPERVISOR
Edward E. Garske	(312) 704-8850
CARLSON ENVIRONMENTAL, INC.	HEALTH AND SAFETY OFFICER
Valerie A. Farrell	(312) 704-8844

2.0 INTRODUCTION

2.1 OBJECTIVE

The Clean Harbors of Chicago, Inc. (Clean Harbors) facility was issued a RCRA Hazardous Waste Management Part B permit (Part B) on September 30, 1993, modified August 8, 1995. According to the Part B permit, corrective action must be conducted, as necessary, to protect human health and the environment from all releases of hazardous wastes or constituents from any solid waste management unit (SWMU) at the facility. The corrective action includes conducting a RCRA Facility Investigation (RFI). The purpose of the RFI is to determine whether releases of hazardous wastes or constituents have occurred at the facility, and if so, the nature and extent of the releases. The results of the RFI will be used to develop a Corrective Action Plan (CAP) which identifies actions necessary to protect human health and the environment.

Specific field activities associated with the Combined Phase II/III of the RFI will include conducting soil borings, installing ground water monitoring wells, installing temporary well points and collecting soil and ground water samples. Subsequent Phases of the RFI may include the identification, excavation and removal of contaminated soils.

2.2 HAZARD RATING FROM ANALYTICAL RESULTS

Due to the variety and uncertainty of the types of wastes managed at the Site in the past samples collected during Phase I of the RFI were analyzed for EPA Priority Pollutants and barium. Analytical results identified the following constituents at high enough levels to warrant additional investigation: volatile organic compounds (VOCs); polychlorinated biphenyls (PCBs); acid-base neutral extractables (Acids, BNs); priority pollutant metals; chromium; and lead. A description of the type of contamination identified at each SWMU and AOC is included in Sections 3.1 and 3.2 of the RFI Combined Phase II/III Work Plan; these sections also describe sampling parameters for this Phase of the RFI.

2.3 SITE AND FACILITY DESCRIPTION

The Clean Harbors facility is located on the eastern shore of Lake Calumet in Chicago, Cook County, Illinois. The Site area is primarily industrial and contains several current and historical waste treatment, storage and disposal (TSD) facilities. The facility is situated on an approximately 26.5 acre earthen pier that was fabricated of fill material in the early 1970s. The eastern portion of the Site is developed and contains buildings and equipment for the treatment, storage, consolidation and/or transport of hazardous and nonhazardous wastes. The western portion, approximately 13.5 acres, is currently undeveloped and is covered with heavy vegetation. The western side of the property, as well as three-quarters of the northern and southern sides, are bounded by Lake Calumet. Stony Island Avenue is the eastern boundary of the Site. The Site is owned by the Illinois International Port District and the address is 11800 South Stony Island Avenue.

The earthen pier is approximately 2,500 feet long by 400 feet wide and was constructed of fill material consisting mostly of cinder, sand, silt, clay and organics. The Site has been utilized as a waste treatment, storage and disposal facility since its construction in the 1970s.

2.4 POLICY STATEMENT

It is the policy of Carlson Environmental, Inc. (CEI) to provide a safe and healthful work environment for all its employees. CEI considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency or shortcuts. At CEI we believe every accident and every injury is avoidable. We will take every reasonable step to reduce the possibility of injury, illness, or accident.

This Site Health and Safety Plan (SHSP) prescribes the procedures that must be followed by all site personnel while on the project Site. Operational changes which could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of Clean Harbors, the CEI Project Manager and the CEI health and safety personnel.

The provisions of this plan are mandatory to all CEI personnel and subcontractors assigned to the project. CEI requires all visitors to any of the work sites to abide by these procedures. Work conditions can change as operations progress. The Health and Safety Manager will provide written addenda to this SHSP when changes warrant. No changes to the plans will be implemented without prior approval of the Health and Safety Manager or his authorized representative.

2.5 REFERENCES

This SHSP complies with applicable Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) regulations. This plan follows the guidelines established in the following documents:

(a) Standard Operating Safety Guides (US EPA November 1984);

(b) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH 85-115);

(c) Title 29 of the Code of Federal Regulations, Part 1910.120 (29 CFR 1910.120); (US DOL/OSHA)

3.0 RESPONSIBILITIES

3.1 ALL PERSONNEL

All personnel are responsible for continuous adherence to these health and safety procedures during the performance of their work. No person may work in a manner that conflicts with the intent of, or the inherent safety and environmental precautions expressed in these procedures. After due warnings, CEI will dismiss from the Site any person who violates safety procedures. CEI employees are subject to progressive discipline and may be terminated for continued violations. All on-site personnel will be trained in accordance with 29 CFR 1910.120, and this document.

3.2 HEALTH AND SAFETY OFFICER AND ON-SITE SAFETY COORDINATOR

The project Health and Safety Officer is responsible for developing and coordinating the Site Health and Safety Plan and addenda as required. This plan complies with 29 CFR 1910.120 in all respects and includes medical surveillance and training requirements, hazard assessment, personal protective equipment specifications, field implementation procedures, and audits. The Health and Safety Officer will issue addenda to the SHSP if warranted by changed conditions. The Health and Safety Officer and his designee report to the Project Manager for operational matters. The Health and Safety Officer is the contact for regulatory agencies on matters of safety and health. Other Health and Safety Officer and On-site Health and Safety Coordinator responsibilities include:

- General Health and Safety program administration;
- Determining the level of personnel protection required;
- Updating equipment or procedures based on information obtained during site operations;
- Establishing air monitoring parameters based on expected contaminants;
- Establishing employee exposure monitoring notification programs;

- Investigating significant accidents and illnesses and implementing corrective action plans;
- Performing regular site inspections; and
- Developing site-specific employee/community emergency response plans, as required, based on expected hazards.

3.3 PROJECT MANAGER

The CEI Project Manager is ultimately responsible for ensuring that all project activities are completed in accordance with requirements set forth in this plan.

3.4 SITE SUPERVISOR

The CEI Site Supervisor supervises all activities at the Site and is responsible for field implementation of the SHSP. This includes communicating site requirements to all personnel, ensuring field supervisors and subcontractors enforce all provisions of the plan, and consulting with the Health and Safety Officer regarding changes to the Site Health and Safety Plan. Other responsibilities include:

- Reading and becoming familiar with this health and safety plan and CEI policies and procedures;
- Enforcing the SHSP and other safety regulations;
- Stopping work as required to ensure personal and environmental health and safety;
- Determining evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation;
- Ensuring that all site personnel and visitors have received the proper training and medical clearance prior to entering the Site (See Section 7 of this plan.)
- Establishing exclusion, decontamination and clean zones (See Section 8 of this plan);
- Presenting tailgate safety meetings and maintaining attendance logs and records;
- Assuring that the respiratory protection program is implemented (See Section 6 of this plan);
- Assuring that decontamination procedures meet established criteria;

- Assuring that there is a qualified first aider on site;
- Discussing potential health and safety hazards with the Health and Safety Officer; and
- Implementing changes as directed by the Health and Safety Officer and Project Manager.

3.5 SUBCONTRACTORS

On-site subcontractors and their personnel are responsible for understanding and complying with all Site requirements. Subcontractors are required to follow the guidelines established in the SHSP.

3.6 ON-SITE PERSONNEL AND VISITORS

All on-site personnel and visitors are required to comply with the provisions of the SHSP and all applicable Federal, State and local regulations. Each person is responsible for their own health and safety, for completing tasks in a safe manner and for reporting any unsafe acts or conditions to his supervisor or the CEI representative. Personnel will monitor themselves and their fellow employees for signs and symptoms of heat/cold stress and chemical exposure.

4.0 JOB HAZARD ANALYSIS

4.1 SCOPE OF WORK

Specific field activities associated with the Combined Phase II/III of the RFI will include conducting soil borings, installing ground water monitoring wells, installing temporary well points and collecting soil and ground water samples. Subsequent Phases of the RFI may include the identification, excavation and removal of contaminated soils, the installation of containment structures and/or the initiation of a ground water treatment system.

4.2 JOB SAFETY ANALYSIS

The Job Safety Analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community and the environment. Because of the complexity and constant change of this type of project, supervisors must continually inspect the work site to identify hazards which may harm site personnel, the community, or the environment. The Project Manager, Site Supervisor, Contractor Supervisor, and On-site Safety Coordinator must be aware of these changing conditions and discuss them with the Health and Safety Officer. The Health and Safety Officer will write addenda to change Job Safety Analysis and associated hazard controls as necessary.

4.2.1 Soil Boring and Sampling Activities

Specific field activities associated with the Combined Phase II/III of the RFI will include conducting soil borings and collecting soil samples. Hazards connected with these activities include dangers associated with the operation of heavy machinery (drill rig) and the potential for exposure to unknown contaminants while collecting samples. On-site personnel will wear steel toed boots, hard hats, safety glasses and protective sampling gloves to reduce their potential for harm. On-site personnel will also be instructed to be aware of drilling activities, listen for backup alarms and keep a safe distance from the boring while the drill rig is operating.

4.2.2 Monitoring Well and Well Point Installation and Sampling Activities

Specific field activities associated with the Combined Phase II/III of the RFI will include emplacing ground water monitoring wells and temporary well points and collecting ground water samples. Hazards connected with these activities include dangers associated with the operation of heavy machinery (drill rig) and the potential for exposure to unknown contaminants while collecting ground water samples. On-site personnel will wear steel toed boots, hard hats, safety glasses and protective sampling gloves to reduce their potential for harm. On-site personnel will also be instructed to be aware of drilling activities, listen for backup alarms and keep a safe distance from the boring while the drill rig is operating.

4.2.3 Excavation of Soil

The Combined Phase II/III of the RFI will be conducted to determine the extent of soil contamination and the nature, if any, of ground water contamination at the Site. These activities will not likely include the excavation of contaminated soils. However, subsequent Phases of the RFI may include the excavation and removal of contaminated soils.

The following constituents were identified at high enough levels, during Phase I of the RFI, to warrant additional investigation: a variety of volatile organic compounds (VOCs); polychlorinated biphenyls (PCBs); acid-base neutral extractables (Acids, BNs); priority pollutant metals; chromium; and lead. A description of the type of contamination identified at each SWMU and AOC is included in Sections 4.0 through 4.3 of the Phase I RFI Report and Sections 3.1 and 3.2 of the RFI Combined Phase II/III Work Plan.

4.3 HAZARDOUS AND TOXIC MATERIALS

Hazards connected with this project are mostly associated with the potential for exposure to unknown materials. Tables containing the potentially hazardous and/or toxic materials identified at the Site to date are included in Attachment C to this Report. These tables will be updated as information developes during the project warrants.

4.4 HEAT AND COLD STRESS

Wearing personal protective equipment (PPE) puts a hazardous waste site worker at considerable risk of heat stress. Heat stress effects range from transient heat fatigue to serious illness and death. Heat stress is caused by several interacting factors, including environmental conditions, clothing, work load, and the individual characteristics of the worker. Because heat stress is the most common and potentially serious illness at hazardous waste sites, preventive measures and alertness to the signs and symptoms are vital.

Heat stress monitoring should begin when personnel are wearing PPE, including Tyvek coveralls, and the ambient temperature exceeds 21°C (70°F). If impermeable garments are not worn, heat stress monitoring should begin at 29°C (85°F).

4.5 CONFINED SPACE ENTRY

Pits and trenches are confined spaces until the atmosphere has been demonstrated safe. Confined space entries are not anticipated with Phase I of the RFI. If subsequent phases of the RFI require confined space entry, CEI and Clean Harbors confined spaced entry and safety procedures will be employed.

4.6 DUST CONTROL AND SPILL CONTROL

Due to the very low potential for contaminated dust on this project, dust control and suppression will not be necessary to protect personnel, the community, and the environment.

4.7 HEARING CONSERVATION

All personnel on site will wear hearing protection while heavy equipment is in operation. If on-site personnel are subjected to noise exceeding an 8-hour, time-weighted average sound level of 90 dBA (decibels on the A-weighted scale), feasible administrative or engineering controls will be utilized. In addition, whenever noise exposure equals or exceeds an 8-hour, time-weighted average sound level of 85 dBA, a hearing conservation program, as described in 29 CFR 1910.95, will be employed.

5.0 SAFETY PROGRAM

The following procedures are mandatory for all CEI and subcontractor personnel. All Site visitors entering exclusion zones must follow these procedures. Personnel not following procedures will be warned. If they refuse to follow these procedures, they will be escorted from the Site.

5.1 GENERAL PRACTICES

- At least one copy of this plan shall be available at the job work site.
- At least one person trained in a minimum of basic first aid and CPR will be on site whenever remediation activities occur. As an alternative, this requirement is satisfied when a 911 emergency responder can respond within five (5) minutes to the Site.
- No food, beverages, tobacco products shall be present, consumed or used in contaminated areas or potentially contaminated areas. Taking medication, smoking or applying cosmetics are also prohibited. These activities are allowed only in the established clean room and clean areas.
- Before eating, drinking, or smoking employees shall wash their hands and remove outer protective garments.
- At the end of each work shift, before leaving the Site, personnel who worked in contaminated zones shall thoroughly shower to remove any contaminants.
- Containers shall be moved only with the proper equipment and shall be secured to prevent dropping or loss of control during transport.
- Emergency equipment shall be located in readily accessible uncontaminated locations. The eyewash must be capable of washing both eyes at once, delivering at least 0.4 gallons per minute for at least 15 minutes. At least one eyewash will be maintained in the contamination reduction zone (CRZ).
- All personnel entering the Site shall be thoroughly briefed on the hazards, equipment requirements, safety practices, emergency procedures, and communication methods.

- Employee entrance and exit routes shall be planned and emergency escape routes designated. A map showing evacuation routes shall be posted at the Site.
- Unfamiliar operations shall be discussed with affected employees before beginning work.
- Operations will be stopped whenever visible dust emissions are generated. Site wetting practices shall be used to control dust emissions.
- Work areas shall be illuminated to a minimum of 20 foot candles. Supplementary lighting may be necessary inside buildings, tanks, at night, or in other poorly lit areas.
- CEI employees will use the sanitary facilities of the Clean Harbors facility. No portable sanitary facilities will be provided.
- No smoking will be permitted on the project except in designated areas.
- Fire extinguishers will be mounted on equipment as required. When there is a fire potential, fire extinguishers will be located in the adjacent area.

5.2 FALL PROTECTION

The walking and working surfaces will become wet, muddy and slippery during rain. Use extra caution when working on muddy ground.

5.3 BUDDY SYSTEM

All on-site personnel shall use the buddy system. Buddies shall maintain visual contact with each other. Personnel must observe each other for signs of heat stress or toxic exposure such as:

1. Changes in complexion and skin discoloration
2. Changes in coordination or demeanor
3. Excessive salivation and pupillary response
4. Changes in speech pattern

Personnel shall inform their supervisor of nonvisual effects of toxic exposure such as:

1. Headaches, dizziness, blurred vision
2. Nausea, cramps

3. Irritation of eyes, skin or respiratory tract

5.4 HEAT AND COLD STRESS

Heat stress, due to protective clothing decreasing body ventilation, is an important factor. Heat stress of employees on site will be monitored by the American Red Cross method of monitoring heart rates as personnel come out for rest and cooling off.

One or more of the following control measures can be used to help control heat stress and are mandatory if heat stress is detected by elevated heart rate above 110 beats per minute.

1. Employees should drink plenty of water throughout the day and should increase their salt intake slightly.
2. On-site drinking water will be kept cool, 10-15°C (50-60°F), to encourage personnel to drink often.
3. A work regimen that will provide adequate rest periods for cooling down will be established as required.
4. All personnel will be advised of the dangers and symptoms of heat stroke and exhaustion.
5. Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
6. Employees shall be admonished to monitor themselves and their co-workers for the effects of heat disorders and to take additional breaks as needed.
7. All breaks are taken in a shaded rest area.
8. Employees shall not do other tasks during rest periods.
9. Employees shall remove impermeable garments during rest periods.
10. All employees shall be informed of the importance of adequate rest, acclimatization and proper diet in the prevention of heat stress.

5.4.1 Signs And Symptoms Of Heat Stress

Heat Cramps:

Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet and abdomen.

Heat Exhaustion:

Heat exhaustion occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin
- Heavy sweating
- Dizziness, Nausea
- Fainting

Heat Stroke:

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occur. Competent medical help must be obtained immediately. This is a true medical emergency. Signs and symptoms are:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Nausea
- Dizziness and confusion
- Strong, rapid pulse initially
- Coma

5.4.2 Cold Stress

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

Employees should be protected from exposure to cold so that the deep core temperature does not fall below 36°C (98.6°F.) Lower body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

- Workers shall be provided with warm clothing, such as mittens and heavy socks, when the air temperature is below 4-7°C (40-45°F.) Protective clothing may be used to protect the employee.
- When the air temperature is below 0-7°C (32-40°F) (depending on employee comfort), clothing for warmth, in addition to protective clothing shall be provided. This will include:

1. Insulated suits, such as whole-body thermal underwear;
2. Wool socks or polypropylene socks to keep moisture off the feet if there is a potential of work activity which would cause sweating;
3. Insulated gloves;
4. Boots; and
5. Insulated head cover, such as knit caps.

- At air temperature below 2°C (35°F) the following work practices must be followed:

1. If the clothing of an employee might become wet on the job site, the outer layer of the clothing must be impermeable to water.
2. If an employee's underclothing (socks, mittens, etc.) becomes wet in any way, the employee must change into dry clothing immediately. If the clothing becomes wet from sweating, the employee may finish the task which caused the sweating before changing into dry clothing.
3. Employees must be provided a warm area, 18°C (65°)F or above, to change from work clothing into street clothing.
4. Employees must be provided a warm break area, 15°C (60°F) or above.
5. Hot liquids, such as soups, warm, sweet drinks, shall be provided in the break area. The intake of coffee shall be limited because of the attendant diuretic and circulatory effects.

6. The buddy system shall be practiced at all times. Any employee observed with severe shivering shall leave the cold area immediately.
7. Employees should layer their clothing. Thinner, lighter clothing should be worn next to the body with heavier clothing layered outside the inner clothing.
8. Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to heat stress problems.
9. Employees handling volatile liquids (such as gasoline, hexane, alcohol) shall take special precautions to avoid spilling liquids on clothing or gloves because of the added danger of cold injury by evaporative cooling.

5.5 HEARING CONSERVATION

All on-site personnel shall wear hearing protection (E.A.R. foam inserts or equivalent) when operating earthmoving equipment or whenever noise levels exceed 85 dBA. All personnel required to wear hearing protection shall receive baseline and annual audiograms and training on the causes and prevention of hearing loss.

The Health and Safety Officer will evaluate noise hazards with appropriate instrumentation, including an ANSI Type 2 or Type 1 sound level meter and noise dosimeters.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) outlined below have been selected according to the site characterization and analysis, job tasks, site hazards, intended use and duration of potential employee exposures. Maintenance and storage of PPE, decontamination, donning and doffing procedures, inspection and monitoring of effectiveness, and limitation are outlined in this section.

6.1 RESPIRATORY PROTECTION

- Only employees who have been trained to wear and maintain respirators properly shall be allowed to use respiratory protection.
- Only properly cleaned, maintained, National Institute of Occupational Safety and Health (NIOSH) approved respirators shall be used on site.
- Selection of respirators, as well as any decisions regarding upgrading or downgrading of respiratory protection, will be made by the Health and Safety Manager or his designee.
- Used air-purifying cartridges shall be replaced at the end of each shift. PAPR cartridges will be changed when flow falls below 4 cfm through the cartridge.
- Positive and negative pressure tests shall be performed each time the respirator is donned.
- Only employees who have been fit tested within the last 12 months will be allowed to work in atmospheres where respirators are required. Subcontractors shall provide certificates of respirator fit test completed within the last 12 months for each employee on site.
- Respirator users shall be instructed in the proper use and limitations of respirators.
- If an employee has difficulty in breathing during the fit test or during use, he shall be evaluated medically to determine if he can wear a respirator safely while performing assigned tasks.
- No employee shall be assigned to tasks requiring the use of respirators if, based upon the most recent examination, a physician determines that the health or safety of the employee

will be impaired by respirator use.

- Contact lenses shall not be worn while using any type of respiratory protection.
- Air-supplied respirators shall be assembled according to manufacturer's specifications. Hose length, couplings, valves, regulators, manifolds and all accessories shall meet ANSI and the manufacturer's requirements.
- Respirators shall be cleaned and sanitized daily after use.
- Respirators shall be stored in a convenient, clean and sanitary location on site.
- Respirators shall be inspected during cleaning. Worn or deteriorated parts shall be replaced.
- Facial hair that might interfere with a good face piece seal or proper operation of the respirator is prohibited.
- The CEI Site Supervisor shall review the respiratory protection program daily to ensure employees are properly wearing and maintaining their respirators and that the respiratory protection is adequately protecting the employees.
- The Health and Safety Manager and the Project Manager shall evaluate the respiratory protection program monthly to ensure the continuing effectiveness.
- Respirators used for emergency response shall be inspected weekly by the Health and Safety Coordinator.

6.2 LEVELS OF PROTECTION

The level of protection used in the exclusion zone is based on site-specific information. The levels of protection are outlined as follows. Specific levels of protection will be changed whenever Site conditions change. They can either be increased to the next higher level or decreased to the next lower level. The decision to change levels of protection will be made by the CEI Site Supervisor with input from the Project Manager and the CEI Health and Safety Officer. If the need arises to protect health and safety, the Site Supervisor can upgrade protection levels without input from the Health and Safety Officer or Project Manager. He will then discuss the decision with the Health and Safety Officer, Health and Safety Coordinator, and the Project Manager when they are available. Levels of protection will not be downgraded without prior approval from the Health and Safety Officer.

6.2.1 Level A Protection

Level A Protection is not anticipated for this project.

6.2.2 Level B Protection

Level B Protection is also not anticipated for this project. Level B Protection will be required if airborne concentrations of toxic contaminants exceed twice the permissible exposure level as determined by personnel monitoring. The Health and Safety Officer will be notified when the decision is made to upgrade to Level B.

The following equipment will be used for Level B Protection:

- Pressure -demand, full-facepiece SCBA or pressure demand supplied air respirator with escape SCBA;
- Hooded one piece chemical-resistant suit (double-layered), tyvek or equal, taped at gloves and boot covers;
- Inner and outer chemical resistant gloves including neoprene, nitrile or other impermeable material;
- Steel toed boots with chemical resistant disposal boot covers;
- Hardhat; and
- Two-way radio communications.

6.2.3 Level C Protection

Level C Protection is anticipated for this project. Level C will be required if concentration of toxic airborne contaminants exceed one-half the OSHA permissible exposure limit (PEL).

The following equipment will be used for Level C Protection:

- Half mask or full-facepiece air-purifying respirators with combination organic vapor/HEPA filter (color-coded black and magenta or black and purple.)
- Hooded one piece chemical-resistant suit (double-layered), tyvek or equal, taped at gloves and boot covers;

- Inner and outer chemical resistant gloves including neoprene, nitrile or other impermeable material (If leather or canvas outer gloves are used, they will be disposed at the end of each shift);
- Steel toed boots with chemical resistant disposal boot covers;
- Hardhat;
- Safety glasses (when using half mask respirators); and
- Two-way radio communication.

6.2.4 Level D Protection

Level D Protection will be used if concentration of toxic airborne contaminants does not exceed one-half the PEL. Site personnel will ensure there is no potential for exposure to toxic vapors or dusts.

The following equipment will be used for Level D Protection:

- Coveralls or work clothes;
- Steel toed boots/shoes;
- Safety glasses;
- Hardhat; and
- Gloves as necessary

6.3 DONNING AND DOFFING

All persons entering the Exclusion Zone shall put on the required personal protective equipment according to established procedures in this plan to minimize exposure potential. When leaving the Exclusion Zone, personal protective equipment shall be removed according to these established procedures to minimize the spread of contamination.

6.3.1 Donning Procedures

- Inspect the clothing and respiratory equipment before donning.
- Remove street clothes and store in a clean location.
- Put on coveralls, work clothes and hooded suit as necessary.

- Put on boots and boot covers as required.
- Put on air tanks and harness assembly of the SCBA. Don and adjust the facepiece. -- Perform negative and positive respirator facepiece seal test procedures.
- Put on inner and outer gloves as necessary.
- Put on remaining protective equipment, such as hard hat, safety glasses, etc.

6.3.2 Doffing Procedures

Whenever a person leaves the work site, the following proper decontamination sequence will be followed:

- Upon entering the Contamination Reduction Zone, rinse contaminated mud and debris from boots.
- Clean reusable protective equipment.
- Remove any extraneous or disposable clothing, boot covers, gloves and tape.
- Remove boots and gloves.
- Wash hands and face thoroughly.
- Clean respirator and prepare for next use.

All disposable equipment, garments, and personal protective equipment shall be bagged in two 6 mil plastic bags, properly labeled and disposed.

6.4 SANITATION

CEI employees will use the sanitary facilities of the Clean Harbors facility. No portable sanitary facilities will be provided.

CEI employees will keep the work and support areas neat and orderly and collect and remove the trash generated by their activities.

7.0 SITE CONTROL

Site control requires establishing specific measures to prevent unauthorized entry onto the Site and to protect all personnel entering the Site from recognized safety and health hazards. The following measures are mandatory:

7.1 AUTHORIZATION TO ENTER

The Project Manager and the Site Supervisor may grant authorization to enter the Site. Access to contaminated work areas is regulated and limited to authorized personnel. Only those who have completed the required training and medical requirements will be allowed to enter. Representatives from regulatory agencies personnel will be permitted to enter the Site at any time during business hours or at other reasonable times by appointment to conduct official business. Representatives of the news media and other visitors must receive authorization from the client and the CEI Project Manager before entry.

7.2 HAZARD BRIEFING

The Site Supervisor shall brief this Site Health and Safety Plan to all personnel entering the Site to inform them of potential health and safety hazards and procedures specific to this site. All personnel shall acknowledge this briefing by signing the Site Health and Safety Plan. This briefing shall be further documented in the daily log.

7.3 DOCUMENTATION OF CERTIFICATION

Personnel entering the Site to work shall have satisfied the medical and training requirements of 29 CFR 1910.120. The project file shall contain copies of certificates documenting status for all on-site personnel. Personnel not entering the exclusion zones need not meet the above requirements. The Site Supervisor shall accommodate requests from representatives from regulatory agencies to review documentation. All visitors must present documentation of current training and medical status before being granted authorization to enter the exclusion zone.

7.4 ENTRY LOG

The Site Supervisor keeps a daily roster of all on-site personnel. The Site Supervisor records the time of entry into and exit from the exclusion zone for each person.

7.5 ENTRY REQUIREMENTS

All personnel entering work or exclusion zones will use the proper personal protective equipment. All personnel entering exclusion zones will enter and exit through the decontamination units and observe the mandatory decontamination procedures.

7.6 EMERGENCY ENTRY AND EXIT

During emergencies, decontamination will be conducted to the extent that is possible without endangering personnel. All persons responding, both on site and off site, will be informed of site safety and health hazards and health hazards associated with contaminated personnel.

8.0 DECONTAMINATION

8.1 CONTAMINATION CONTROL ZONES

The Project Manager shall establish contamination control zones for the project based on the location of contamination, remediation activities, accessibility, and site control. These zones must be clearly marked and defended against unauthorized entry.

8.1.1 Exclusion Zone

An exclusion zone is the area where contamination does or could occur. This zone has the highest potential for exposure to the contaminants by contact or inhalation.

8.1.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is established at the entry and exit to the exclusion zone. Decontamination activities take place in the CRZ.

8.1.3 Support Zone

Support zones are established in uncontaminated areas and are used for the storage of supplies and general administrative functions.

8.2 POSTING

The perimeter fence is posted with "keep out" signs. Warning tape will be posted to delineate the exclusion zone and excavations.

8.3 DECONTAMINATION GENERAL RULES

- An area outside of the exclusion zone shall be designated as the break area. Employees shall proceed through personal decontamination before eating, drinking or smoking. No eating, drinking or smoking shall take place in the exclusion zone.
- The Site Supervisor shall monitor the effectiveness of the decontamination procedures and if ineffective shall take appropriate steps to correct any deficiencies or modify the plan as needed.

8.4 EQUIPMENT DECONTAMINATION

The purpose of the Contamination Reduction Zone is to limit the spread of contamination by contaminated personnel, tools, equipment and materials from the Exclusion Zone. Any person, tool, equipment or material from inside the Exclusion Zone will be considered contaminated and must be cleaned before leaving the work site.

8.5 PERSONAL PROTECTIVE EQUIPMENT DECONTAMINATION

Whenever a person leaves the work site, the following proper decontamination sequence will be followed:

- Rinse contaminated mud, etc. from boots or remove boot covers.
- Remove protective garments and equipment and respirator. All disposable clothing should placed in plastic bags and labeled as contaminated waste.
- Reusable protective equipment must either be cleaned on site or bagged and returned to stockroom with appropriate warning labels.
- Remove respirator after contaminated outer wear has been removed.
- Thoroughly wash hands and face.
- Clean respirator and prepare for next use.

All disposable equipment, garments, and personal protective equipment shall be bagged in two 6 mil plastic bags, properly labeled and disposed.

All contaminated reusable equipment, garments, and personal protective equipment which is not cleaned on site shall be bagged in two 6 mil plastic bags, properly labeled and returned to the stockroom for decontamination.

9.0 SITE MONITORING

9.1 AIR MONITORING

Air in the breathing zone will be monitored whenever odor indicates the presence of airborne contaminants. When H-Nu, PID or FID indicates 5 ppm above background, level of protection will be upgraded from Level D to Level C and the Health and Safety Officer notified.

The oxygen content of the air will be monitored. If the oxygen level in the air falls below 19.5 %, air-supplied respiratory equipment will be provided. If an oxygen-rich atmosphere occurs, there is an increased potential for fire. The presence or absence of combustible gases or vapors at the Site will also be monitored. If readings approach or exceed 10 % of the lower explosive limit (LEL), work shall stop and the site shall be evaluated. Work may not resume until combustible gas levels are below 10 % LEL.

9.2 HAZARDOUS CONDITIONS

The Site Supervisor shall take affirmative action to limit exposures. If unknown chemicals or contamination are encountered, operations will cease until the situation is evaluated. The Site Supervisor shall contact the Health and Safety Officer to evaluate any potentially hazardous situations, or any situation with elevated contamination levels. Operations will only be resumed if they can be accomplished in a safe manner.

9.3 NOISE MONITORING

Noise monitoring will be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas around or operating heavy equipment.

On-site personnel must wear monitoring equipment as instructed by the health and safety representative. Refusal to wear monitoring equipment or intentional tampering with sampling apparatus will lead to immediate dismissal from the job site.

9.4 MONITORING AND RECORDKEEPING

The Health and Safety Officer or his designee will be responsible for establishing and maintaining records of all required monitoring as described below;

- Employee name and social security number;
- The date, time, pertinent task information, exposure information;
- Description of the analytical methods, equipment used, calibration data;
- Type of personal protective equipment worn;
- Engineering controls used to reduce exposure.

10.0 EMPLOYEE TRAINING

10.1 GENERAL

CEI trains all field personnel according to 29 CFR 1910.120 before their initial assignment to any project. All field employees receive a minimum of 40 hours of training off site and a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Subcontractor personnel must meet the above training requirements. Personnel, including subcontractors, whose activities are limited to nonhazardous activities must complete 24 hours of training off site and 8 hours of on site training. Asbestos workers receive 40 hours of classroom training for asbestos work.

On-site management and supervision receive a minimum of 8 hours of additional training on program supervision. Each hazardous waste operations employee receives 8 hours annually of refresher training on the topics listed in the course content.

10.2 SITE WORKERS COURSE CONTENT

Following is a general list of topics covered in the 40-hour course:

- General site safety
- Physical hazards (fall protection, noise, heat stress, cold stress)
- Names and titles of key personnel responsible for site health and safety
- Safety, health and other hazards present at the site
- Use of personal protective equipment
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements including recognition of symptoms and signs which might indicate over exposure to hazards
- Worker Right-to-Know
- Routes of exposure to on-site contaminants
- Engineering controls and safe work practices

- Components of the site health and safety program
- Decontamination practices for personnel and equipment
- Confined space entry procedures
- Emergency response plan

10.3 SUPERVISORS COURSE CONTENT

Management and supervisors receive an additional 8 hours of training which includes:

- General safety and health program
- Personal protective equipment program
- Spill containment program
- Air monitoring techniques

10.4 ASBESTOS WORKERS COURSE CONTENT

Following is a general list of topics covered in the 40-hour course:

- Methods of recognizing asbestos and asbestos-containing materials
- Health effects associated with asbestos, the relationship between asbestos exposure and lung cancer
- Operations which may lead to asbestos exposure
- Exposure mitigation practices and procedures
- Engineering and work practice controls for minimizing exposures
- Respiratory protection
- Housekeeping procedures
- Hygiene facilities and procedures
- Protective clothing
- Decontamination procedures
- Emergency procedures
- Waste disposal procedures
- Medical surveillance program
- OSHA asbestos standard

10.5 PRE-ENTRY BRIEFINGS

The following training sessions and informational materials are provided at each project site:

10.5.1 Tailgate Safety Meetings

The Site Supervisor conducts a tailgate safety meeting the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting include health and safety considerations for the day's activities, necessary protective equipment, problems encountered, and new operations. Attendance records and meeting notes are maintained with the project files.

10.5.2 Material Safety Data Sheets

The following constituents were identified at high enough levels, during Phase I of the RFI, to warrant additional investigation: a variety of volatile organic compounds (VOCs); polychlorinated biphenyls (PCBs); acid-base neutral extractables (Acids, BNs); priority pollutant metals; chromium; and lead. A description of the type of contamination identified at each SWMU and AOC is included in Sections 4.0 through 4.3 of the Phase I RFI Report and Sections 3.1 and 3.2 of the RFI Combined Phase II/III Work Plan. A list of the contaminants is included in Attachment C.

10.5.3 Health and Safety Plans

CEI prepares a site-specific health and safety plan for each project falling within the scope and application of 29 CFR 1910.120. Injury and illness prevention programs are written for all other projects. The Site Supervisor presents the health and safety plan and discusses it with everybody assigned to the project. All workers and visitors must read and sign the health and safety plan acknowledging acceptance of site rules and understanding of site hazards before entering.

11.0 MEDICAL SURVEILLANCE

11.1 PHYSICAL EXAMINATION

All personnel on site will have successfully completed a pre-placement or periodic/update physical examination. This examination has been designed to meet the requirements of 29 CFR 1910.120 requirements for hazardous waste site operations and 29 CFR 1926.58 requirements for asbestos operations.

The CEI medical surveillance program examination consists of:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count with differential
- SMAC 24
- Urinalysis
- Chest x-ray
- Pulmonary function test
- Audiogram
- Visual acuity

The following information is provided to the examining physician:

- Description of employee's duties
- Anticipated chemical and asbestos exposure and levels
- Description of the personal protective equipment to be used
- Information from previous medical exams

A copy of the medical examination is provided at the employee's request. The employee shall be informed of any medical conditions that would result in work restriction or that would prevent them from working at hazardous waste sites.

Contractors will certify that all their employees have successfully completed a physical examination by a qualified physician on the Certification Form (Appendix B). The physical examinations shall meet the requirements of 29 CFR 1910.120, and 29 CFR 1910.134.

Contractors will supply copies of the medical examination certificate for each on-site employee.

11.2 MEDICAL RECORDS

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1910.20 and shall be kept for a minimum of 30 years. Employee confidentiality shall be maintained.

12.0 EMERGENCY PROCEDURES

The Site Health and Safety Plan has been developed to allow remediation activities and operations to be conducted without adverse impacts on the health and safety of the worker, environment and community. Supplementary emergency response procedures are included to cover extraordinary conditions that might occur at various sites.

12.1 GENERAL

The Site Supervisor and Health and Safety Coordinator will establish evacuation routes and assembly areas for each site. All personnel entering the Site will be informed of these routes and assembly areas. If the site is large and the evacuation routes are not clear, a site plan will be made marking the evacuation routes and will be posted at conspicuous locations.

Each site will be evaluated for the potential for fire, explosion, chemical release or other catastrophic events. Based on site characterization and remediation activities, chemical releases and explosions are not likely to occur. Unusual events, activities, chemicals and conditions will be reported to the Site Supervisor.

12.2 EMERGENCY RESPONSE

All incidents will be dealt with in a manner to minimize adverse health risks to site workers, the environment and the local community. If an incident occurs the following procedure will be followed:

The Site Supervisor will be the site emergency coordinator and will evaluate each incident to determine the extent of the incident and the need for outside assistance. Outside assistance will be requested as needed. The emergency coordinator will act as liaison between responding agencies and site personnel. The emergency coordinator will notify the Project Manager and Health and Safety Officer of any incident, maintain appropriate records and report incidents.

The emergency coordinator has the authority to commit resources as needed to contain and control released material and to prevent its spread to off site areas.

12.3 SAFETY SIGNALS

Vehicle, tractor, or portable horns will be used for safety signals as follows:

1 Long Blast:	Emergency evacuation
2 Short Blasts:	Clear working area around powered or moving equipment

12.4 MEDICAL EMERGENCIES

Paramedics will be summoned without delay in the event of a medical emergency. The emergency coordinator will stay on the line with the 911 operator until the 911 operator hangs up.

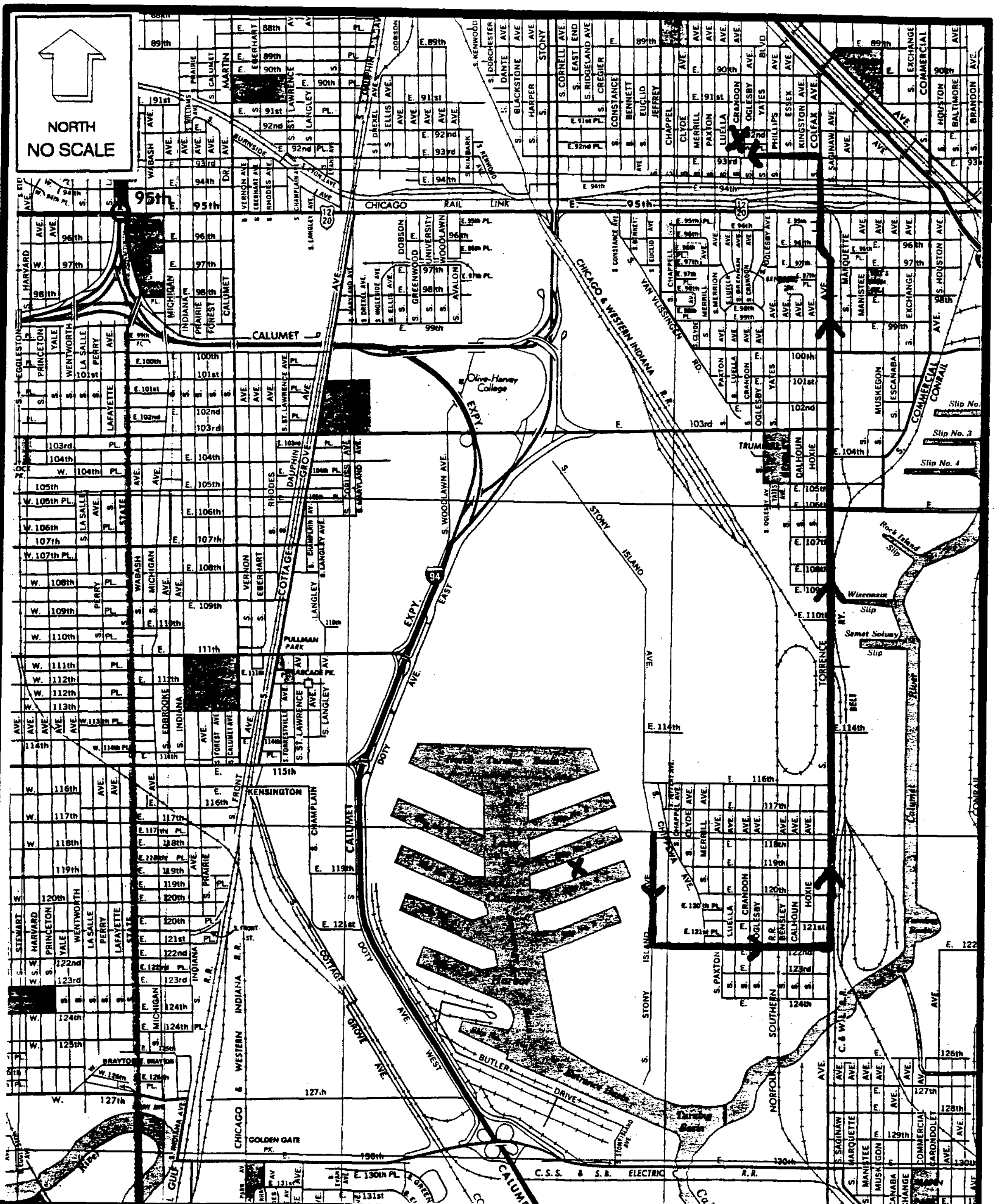
12.5 REPORTING INJURIES AND ILLNESSES

Employees will report all injuries to their supervisor immediately and illnesses as soon as the employee knows he is sick. Supervisors will complete a report of injury within 24 hours of the occurrence. The report of injury will be kept in the project file.

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT A

SITE AND HOSPITAL LOCATION MAP



CARLSON ENVIRONMENTAL, Inc.
312 West Randolph Street
Chicago, Illinois 60606
(312) 346-2140

ROUTE TO HOSPITAL

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT B

CONTRACTOR CERTIFICATION

CARLSON ENVIRONMENTAL, Inc.

CONTRACTOR CERTIFICATION

I, ____

as an agent of ____, do hereby certify that the following employees have successfully completed a 40 hour training course which complies with the provisions of 29 CFR 1910.120, and respiratory protection training which complies with 8 CCR 5144. Each employee has successfully completed a medical examination which complies with the above regulations.

Individual copies of certification of successful completion of the required training and medical examination are attached for each employee.

_____________________________ _____________________________

Signature Date

CARLSON ENVIRONMENTAL, inc.

ATTACHMENT C
CHEMICAL INFORMATION

TABLE THREE
POLYCHLORINATED BIPHENYL CONTAMINATION
(mg/kg)

BOREHOLE	AROCLOR 1248	AROCLOR 1242	AROCLOR 1260
B - 01E (08 -10 FT)	-	-	-
B - 02F (10 - 12 FT)	-	-	-
B - 03A (00 - 02 FT)	4.6	-	-
B - 03B (02 - 04 FT)	-	-	-
B - 04F (10 - 12 FT)	-	-	-
B - 05I (16 - 18 FT)	-	-	-
B - 06A (00 - 02 FT)	-	-	-
B - 07E (08 - 10 FT)	-	0.5	-
B - 07G (12 - 14 FT)	-	57	-
B - 07I (16 -18 FT)	-	-	-
B - 08E (08 - 10 FT)	-	-	-
B - 09E (08 - 10 FT)	-	-	-
B -10A (00 - 02 FT)	-	-	-
B - 11F (10 - 12 FT)	-	-	-
B - 12G (12 - 14 FT)	-	-	-
B - 13A (00 - 02 FT)	-	-	-
B - 14C (04 - 06 FT)	-	-	-
B - 15I (16 - 18 FT)	-	-	-
B - 16E (08 - 10 FT)	-	-	-
B - 18A (00 - 02 FT)	-	-	-
B - 19E (08 -10 FT)	-	-	-
B -20A (00 -02 FT)	-	-	0.4
B - 21A (00 -02 FT)	-	-	-
B - 22B (02 - 04 FT)	-	-	-
B - 23B (02-04 FT)	-	-	-
B - 24C (04 - 06 FT)	-	-	-
B - 25E (08 - 10 FT)	-	-	-
B - 26E (08 - 10 FT)	-	-	-
B - 27A (00 - 02 FT)	-	-	-
B - 28C (06 -08 FT)	-	-	-
B - 29C (04 - 06 FT)	-	-	-
B - 30B (02 - 04 FT)	-	2.7	-
B - 30D (06 -08 FT)	-	-	-

IEPA CLEANUP OBJECTIVES

CLASS I	NE	NE	NE
CLASS II	NE	NE	NE
TSCA SPILL LIMITS	10	10	10

BOREHOLE	AROCLOR 1248	AROCLOR 1242	AROCLOR 1260
B - 31E (8-10 FT)	-	-	21
B - 31F (10-12 FT)	-	2.8	12
B - 31H (14-16 FT)	-	0.3	0.3
B - 32F (10 -12 FT)	-	-	-
B - 33F (10 -12 FT)	-	-	-
B - 34E (08 - 10 FT)	-	-	-
B - 35D (06 - 08 FT)	-	-	-
B - 36E (08 - 10 FT)	-	-	-
B - 36E (08 -10 FT) (DUP)	-	-	-
B - 37I (16 - 18 FT)	-	-	-
B - 38I (16 - 18 FT)	-	-	-
B - 39E (08 - 10 FT)	-	-	-
B - 40G (12 - 14 FT)	-	-	-
B - 41G (12 - 14 FT)	-	-	-
B - 42C (04 - 06 FT)	-	-	18
B - 42E (08 - 10 FT)	-	-	0.5
B - 43C (04 - 06 FT)	-	-	-
B - 44C (04 - 06 FT)	-	-	-
B - 45C (04 - 06 FT)	-	0.4	-
B - 46C (04 - 06 FT)	-	-	-
B - 47C (04 - 06 FT)	-	-	-
B - 48E (08 - 10 FT)	-	-	-
B - 49E (08 - 10 FT)	-	-	-
B - 50E (08 - 10 FT)	-	-	-
B - 51E (08 - 10 FT)	-	-	-
B - 52G (14 - 16 FT)	-	-	-
B - 53E (08 - 10 FT)	-	-	-
B - 54E (08 - 10 FT)	-	-	-
B - 55C (04 - 06 FT)	-	-	-
B - 56C (04 - 06 FT)	-	-	-
B - 57E (08 - 10 FT)	-	-	-
B - 58I (16 - 18 FT)	-	-	-
B - 59E (8-10 FT)			
B - 60E (08 - 10 FT)	-	-	-

IEPA CLEANUP OBJECTIVES

CLASS I	NE	NE	NE
CLASS II	NE	NE	NE
TSCA SPILL LIMITS	10	10	10

Note: Shaded areas indicate concentrations above the TSCA Spill Limits.

TABLE FOUR
CYANIDE CONTAMINATION
(mg/kg)

SAMPLE # (DEPTH)	CYANIDE
B - 01F (10-12 FT)	–
B - 02D (6-8 FT)	38
B - 02G (12-14 FT)	490
B - 02H (14-16 FT)	310
B - 02I (16-18 FT)	3.8
B - 02J (18-20 FT)	17
B - 03A (0-2 FT)	4.4
B - 04F (10-12 FT)	1.7
B - 05I (16-18 FT)	–
B - 06A (0-2 FT)	–
B - 07H (14-16 FT)	1.3
B - 08F (10-12 FT)	–
B - 09C (4-6 FT)	4.5
B - 10A (0-2 FT)	–
B - 11A (0-2 FT)	1.1
B - 12D (6-8 FT)	–
B - 13A (0-2 FT)	3.8
B - 14C (4-6 FT)	–
B - 15I (16-18 FT)	–
B - 16A (0-2 FT)	–
B - 18E (8-10 FT)	–
B - 19A (0-2 FT)	7.1
B - 19E (8-10 FT)	7.1
B - 20F (10-12 FT)	7.9
B - 20H (14-16 FT)	–
B - 21E (8-10 FT)	–
B - 22E (8-10 FT)	–
B - 23F (10-12 FT)	–
B - 24C (4-6 FT)	–
B - 25E (8-10 FT)	–
B - 26E (8-10 FT)	–
B - 27E (8-10 FT)	–

IEPA CLEANUP OBJECTIVES

CLASS I	0.2
CLASS II	0.6

SAMPLE # (DEPTH)	CYANIDE
B - 28C (4-6 FT)	–
B - 29I (16-18 FT)	–
B - 30B (2-4 FT)	4.3
B - 31F (10-12 FT)	2.8
B - 32F (10-12 FT)	2.4
B - 33D (6-8 FT)	–
B - 34E (8-10 FT)	2.2
B - 35E (8-10 FT)	2.5
B - 36G (12-14 FT)	5.9
B - 36G (12-14 FT) (DUP)	3.5
B - 37H (14-16 FT)	14
B - 37I (16-18 FT)	16
B - 37J (18-20 FT)	4.4
B - 38E (8-10 FT)	7.7
B - 38H (14-16 FT)	45
B - 38I (16-18 FT)	24
B - 38L (22-24 FT)	1.4
B - 39E (8-10 FT)	–
B - 40F (10-12 FT)	–
B - 41G (12-14 FT)	–
B - 42C (4-6 FT)	–
B - 43C (4-6 FT)	–
B - 44C (4-6 FT)	–
B - 45C (4-6 FT)	–
B - 46C (4-6 FT)	–
B - 47C (4-6 FT)	–
B - 48D (6-8 FT)	2.4
B - 48E (8-10 FT)	24
B - 49E (8-10 FT)	6.8
B - 50E (8-10 FT)	–
B - 51E (8-10 FT)	–
B - 52G (12-14 FT)	–

IEPA CLEANUP OBJECTIVES

CLASS I	0.2
CLASS II	0.6

SAMPLE # (DEPTH)	CYANIDE
B - 53C (4-6 FT)	–
B - 54E (8-10 FT)	3.9
B - 55E (8-10 FT)	–
B - 56D (6-8 FT)	2.2
B - 56E (8-10 FT)	35
B - 56G (12-14 FT)	63
B - 56H (14-16 FT)	–
B - 56J (18-20 FT)	–
B - 57E (8-10 FT)	–
B - 58C (4-6 FT)	–
B - 59E (8-10 FT)	–
B - 60E (8-10 FT)	2.6

IEPA CLEANUP OBJECTIVES

CLASS I	0.2
CLASS II	0.6

Note : Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE FIVE
METAL CONTAMINATION
(mg/L)

SAMPLE # (DEPTH)	Cd	Cr	Cu	Zn	An	Ni	As	Be	Ba	Pb	Ag
B - 01F (10-12 FT)	–	0.018	–	0.52	–	–	–	–	–	**0.08**	–
B - 02D (6-8 FT)	–	0.016	–	**5.4**	–	–	–	–	–	–	0.009
B - 02H (14-16 FT)	–	–	–	0.6	–	–	–	–	–	**0.45**	–
B - 02I (16-18 FT)	–	–	–	–	–	–	–	–	0.74	–	–
B - 03A (0-2 FT)	–	0.019	0.009	–	–	–	–	–	–	–	–
B - 04F (10-12 FT)	–	–	–	–	–	–	–	–	0.73	–	–
B - 05G (12-14 FT)	NO METALS DETECTED										
B - 05I (16-18 FT)	0.004	–	0.028	0.58	–	–	–	–	–	**0.73**	–
B - 05J (18-20 FT)	0.003	–	0.01	–	–	0.064	–	–	–	–	–
B - 06A (0-2 FT)	**0.017**	0.033	0.036	0.54	–	0.078	–	–	1.3	**0.16**	–
B - 06B (2-4 FT)	0.003	–	0.012	–	–	–	–	–	–	–	–
B - 07H (14-16 FT)	–	–	–	0.97	–	–	–	–	–	**0.13**	–
B - 08F (10-12 FT)	NO METALS DETECTED										
B - 09C (4-6 FT)	–	0.01	–	3.8	–	0.086	–	–	–	–	–
B - 10A (0-2 FT)	–	0.008	0.008	–	–	–	–	–	0.51	–	–
B - 11A (0-2 FT)	**0.007**	0.044	0.011	–	–	–	–	–	–	**0.04**	–
B - 12D (6-8 FT)	–	–	0.008	–	–	–	–	–	–	–	–
B - 13A (0-2 FT)	–	–	0.051	0.54	–	–	–	–	–	–	–
B - 14C (4-6 FT)	NO METALS DETECTED										
B - 15I (16-18 FT)	–	0.019	0.133	–	–	–	–	0.001	0.64	–	–
B - 16A (0-2 FT)	**0.013**	**0.175**	0.087	1.1	–	–	–	0.001	1.1	**0.27**	–
B - 16E (8-10 FT)	**0.006**	**0.393**	–	2.1	–	–	–	**0.007**	1.1	**0.31**	0.013
B - 18E (8-10 FT)	**0.008**	**6.9**	–	**7.6**	0.06	–	**0.06**	**0.009**	0.68	–	0.01
B - 18F (10-12 FT)	–	–	0.021	–	–	–	–	–	–	–	0.006
B - 18J (18-20 FT)	–	–	–	–	–	–	–	–	0.76	–	0.006
B - 19E (8-10 FT)	–	0.015	–	–	–	–	–	–	0.52	–	0.014
B - 20F (10-12 FT)	–	0.011	–	1.1	–	–	–	–	–	–	–
B - 21E (8-10 FT)	NO METALS DETECTED										
B - 22E (8-10 FT)	–	0.031	–	–	–	–	–	–	–	–	–
B - 23D (6-8 FT)	–	–	0.015	–	–	–	–	–	0.72	**0.27**	0.005
B - 23F (10-12 FT)	**0.006**	0.008	0.023	0.82	–	–	–	–	–	**0.2**	–
B - 23I (16-18 FT)	–	–	–	–	0.03	–	–	–	0.85	–	0.006
B - 24C (4-6 FT)	**0.005**	–	0.024	–	–	–	–	–	–	–	–
B - 25E (8-10 FT)	**0.005**	–	–	–	–	–	–	–	0.79	**0.11**	–
B - 26E (8-10 FT)	**0.021**	–	–	–	0.04	–	–	–	–	–	–
B - 27E (8-10 FT)	**0.056**	0.058	0.03	–	0.04	–	–	**0.005**	–	–	–
B - 27E (8-10 FT) (DUP)	–	–	–	–	0.04	–	–	–	–	–	–
B - 28C (4-6 FT)	0.003	–	0.012	–	–	**0.15**	–	–	–	–	0.014
B - 29I (16-18 FT)	NO METALS DETECTED										
B - 30B (2-4 FT)	–	**0.125**	0.051	1	–	–	–	–	–	–	–
B - 30D (6-8 FT)	–	0.014	–	–	–	–	–	–	–	–	–

IEPA CLEANUP OBJECTIVES

	Cd	Cr	Cu	Zn	An	Ni	As	Be	Ba	Pb	Ag
CLASS I	0.005	0.1	0.65	5	NE	0.1	0.05	0.004	NE	0.01	0.05
CLASS II	0.05	1	0.65	10	NE	2	0.2	NE	NE	0.1	NE
RCRA HAZARD. WASTE LIMIT	1	5	NE	NE	NE	NE	5	NE	10	5	5

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE FIVE
METAL CONTAMINATION
(mg/L)

SAMPLE # (DEPTH)	Cd	Cr	Cu	Zn	An	Ni	As	Be	Ba	Pb	Ag
B - 30E (8-10 FT)	–	–	–	–	–	–	–	–	–	–	0.007
B - 31F (10-12 FT)	–	–	0.051	–	–	–	–	–	–	–	–
B - 32F (10-12 FT)	–	–	0.01	–	0.03	0.019	–	–	–	–	–
B - 33D (6-8 FT)	–	**0.11**	0.015	–	–	–	–	–	–	–	–
B - 34E (8-10 FT)	NO METALS DETECTED										
B - 35E (8-10 FT)	–	–	0.013	–	0.04	–	–	–	–	–	–
B - 36G (12-14 FT)	–	–	0.031	–	–	–	–	–	–	–	–
B - 36G (12-14 FT)(DUP)	–	–	0.057	0.51	–	–	–	–	–	–	–
B - 37I (16-18 FT)	–	–	0.048	–	–	–	–	–	–	–	–
B - 38H (14-16 FT)	–	0.009	–	1.1	–	–	–	0.001	–	**0.07**	0.007
B - 39E (8-10 FT)	**0.007**	0.04	0.074	0.9	–	–	–	0.003	–	**0.03**	0.011
B - 40F (10-12 FT)	–	–	0.011	–	–	–	–	–	–	–	0.01
B - 41G (12-14 FT)	–	–	–	3.2	–	–	–	–	–	–	0.006
B - 42C (4-6 FT)	–	–	–	–	–	–	–	–	–	**0.09**	0.009
B - 43C (4-6 FT)	–	–	–	–	–	–	–	–	0.52	–	0.007
B - 44C (4-6 FT)	–	–	–	–	–	–	–	–	0.77	–	–
B - 45C (4-6 FT)	–	–	–	–	–	0.008	–	–	–	–	–
B - 46C (4-6 FT)	–	–	0.024	–	0.03	–	–	–	–	–	–
B - 47C (4-6 FT)	–	–	–	–	–	–	–	–	0.64	–	–
B - 48E (8-10 FT)	–	–	–	–	–	–	–	–	–	–	0.007
B - 49E (8-10 FT)	0.003	–	0.026	–	–	–	–	–	–	–	0.007
B - 50E (8-10 FT)	–	–	0.019	–	–	–	–	–	–	**0.01**	–
B - 51E (8-10 FT)	–	–	–	**10**	–	**0.288**	–	–	–	–	0.007
B - 52G (12-14 FT)	–	–	–	–	–	–	–	–	–	–	0.007
B - 53C (4-6 FT)	–	–	–	–	–	–	–	–	–	–	0.009
B - 54E (8-10 FT)	–	–	–	–	–	–	–	–	–	–	0.008
B - 55E (8-10 FT)	–	–	0.013	–	–	–	–	–	–	–	0.008
B - 56E (8-10 FT)	0.004	–	0.012	–	–	–	–	–	–	–	0.009
B - 57E (8-10 FT)	–	–	0.061	0.58	–	**0.155**	–	–	–	–	0.011
B - 58C (4-6 FT)	–	–	0.013	–	–	–	–	–	–	–	0.008
B - 59B (2-4 FT)	0.016	0.011	0.39	0.77	–	–	–	–	–	–	–
B - 59D (6-8 FT)	**0.032**	0.029	0.375	–	0.03	**0.268**	–	–	–	–	–
B - 59E (8-10 FT)	**0.398**	**3.79**	**13.2**	**16**	0.06	**1.89**	–	**0.007**	–	**0.46**	–
B - 59G (12-14 FT)	**0.089**	**0.211**	0.104	3.2	0.04	–	–	**0.012**	–	–	–
B - 59I (16-18 FT)	–	–	0.077	–	–	0.032	–	–	1	–	–
B - 60E (8-10 FT)	–	–	0.011	–	–	–	–	–	–	–	0.009

IEPA CLEANUP OBJECTIVES

	Cd	Cr	Cu	Zn	An	Ni	As	Be	Ba	Pb	Ag
CLASS I	0.005	0.1	0.65	5	NE	0.1	0.05	0.004	NE	0.01	0.05
CLASS II	0.05	1	0.65	10	NE	2	0.2	NE	NE	0.1	NE
RCRA HAZARD. WASTE LIMIT	1	5	NE	NE	NE	NE	5	NE	10	5	5

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

SAMPLE # (DEPTH)	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 01F (10-12 FT)	--	--	--	--	--	--	--	--	--	0.017	--	--	--	--	--	--	--	--	--
B - 02G (12-14 FT)	NO VOLATILES DETECTED																		
B - 03A (0-2 FT)	NO VOLATILES DETECTED																		
B - 04I (16-18 FT)	NO VOLATILES DETECTED																		
B - 05I (16-18 FT)	NO VOLATILES DETECTED																		
B - 06B (2-4 FT)	NO VOLATILES DETECTED																		
B - 07G (12-14 FT)	NO VOLATILES DETECTED																		
B - 08E (8-10 FT)	--	--	**24**	4.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 08F (10-12 FT)	--	--	0.006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 09C (4-6 FT)	--	**6.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 09D (6-8 FT)	--	--	**160**	**150**	--	--	--	--	--	--	**46**	--	--	--	--	--	--	--	--
B - 09E (8-10 FT)	--	--	0.56	3.3	--	--	--	--	--	--	**0.75**	--	--	--	--	--	1	10	--
B - 10D (6-8 FT)	NO VOLATILES DETECTED																		
B - 11F (10-12 FT)	NO VOLATILES DETECTED																		
B - 12F (10-12 FT)	--	--	0.87	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 13H (14-16 FT)	--	--	0.01	--	0.38	--	--	--	0.02	--	--	**0.1**	--	--	--	--	--	--	--
B - 13J (18-20 FT)	**0.32**	--	0.86	0.4	**1.1**	--	--	**0.43**	0.37	--	--	--	--	--	--	--	--	--	--
B - 14J (18-20 FT)	NO VOLATILES DETECTED																		
B - 15G (12-14 FT)	--	--	0.33	0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 16E (8-10 FT)	--	--	--	0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

IEPA CLEANUP OBJECTIVES

CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 16F (10-12 FT)	**0.68**	--	0.95	0.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 17A (0-2 FT)	NO VOLATILES DETECTED																		
B - 18H (14-16 FT)	**0.015**	--	0.11	0.005	0.091	--	--	--	0.012	--	--	**0.16**	--	--	--	--	--	--	--
B - 18I (16-18 FT)	--	--	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 19E (8-10 FT)	NO VOLATILES DETECTED																		
B - 19G (12-14 FT)	**0.69**	--	**1.2**	0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 19I (16-18 FT)	--	--	0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 20I (16-18 FT)	NO VOLATILES DETECTED																		
B - 21B (2-4 FT)	--	--	--	9.3	--	--	--	--	--	--	**1.5**	--	--	--	--	--	--	--	--
B - 22I (16-18 FT)	NO VOLATILES DETECTED																		
B - 23I (16-18 FT)	--	--	0.006	--	--	--	--	--	--	--	--	--	**0.018**	--	--	--	--	--	--
B - 24J (18-20 FT)	--	--	--	--	0.11	--	--	--	--	--	--	**0.054**	--	--	--	--	--	--	--
B - 25C (4-6 FT)	NO VOLATILES DETECTED																		
B - 25D (6-8 FT)	--	--	--	--	0.053	--	--	--	--	--	--	**0.086**	--	--	--	--	--	--	--
B - 25F (10-12 FT)	**0.006**	--	--	--	0.025	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 26F (10-12 FT)	**0.056**	--	0.008	--	0.19	--	0.021	--	0.027	--	--	--	--	0.006	**0.007**	--	--	--	--
B - 26G (12-14 FT)	--	--	--	--	0.099	--	--	--	--	--	--	**0.039**	--	--	--	--	--	--	--
B - 26I (16-18 FT)	NO VOLATILES DETECTED																		
B - 27B (2-4 FT)	--	--	--	5	**23**	--	--	--	7.2	--	--	--	--	--	--	--	--	--	--
B - 27F (10-12 FT)	--	--	--	--	**1.6**	--	--	--	4.7	--	--	--	--	--	--	--	--	--	--
IEPA CLEANUP OBJECTIVES																			
CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 27H (14-16 FT)	--	--	0.01	--	0.025	--	--	--	--	--	--	**0.032**	--	--	--	--	--	--	--
B - 27I (16-18 FT)	--	--	--	--	0.069	--	--	--	0.005	--	--	**0.1**	--	--	--	--	--	--	--
B - 27I (16-18 FT) (DUP)	--	--	0.01	0.005	0.33	--	--	--	0.11	--	--		--	--	--	--	--	--	--
B - 27J (18-20 FT)	--	--	0.012	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 28C (4-6 FT)	--	--	160	1,100	--	--	--	--	--	--	320	--	--	--	--	210	--	--	--
B - 28F (10-12 FT)	--	--	130	160	--	--	--	--	--	--	720	1,600	--	--	--	--	--	--	--
B - 28G (12-14 FT)	--	--	3	12	25	--	--	--	--	--	9.9	86	--	--	--	--	--	--	--
B - 28H (14-16 FT)	--	--	**2.1**	8.6	27	--	2.6	--	1.9	--	6.8	9.7	--	--	--	1	--	--	--
B - 28I (16-18 FT)	--	--	--	2.3	24	--	--	--	1	--	13	30	--	--	--	--	--	--	--
B - 28J (18-20 FT)	--	--	**1.5**	5.1	--	--	--	--	--	--	4.7	6.2	--	--	--	--	--	--	--
B - 29O (28-30 FT)	--	--	--	--	0.026	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 30N (26-28 FT)	--	--	--	--	0.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 31E (8-10 FT)	--	77	1,600	500	--	--	--	--	--	--	110	--	--	--	66	--	--	--	--
B - 31F (10-12 FT)	64	--	1,700	140	--	--	--	--	--	--	--	400	--	--	--	--	--	--	--
B - 31H (14-16 FT)	--	0.74	23	10	2.4	--	--	--	--	--	2	--	--	--	--	--	--	--	--
B - 32G (12-14 FT)	--	--	0.39	0.44	1.5	--	--	--	1.6	--	--	--	--	--	--	--	--	--	--
B - 33C (4-6 FT)	--	62	--	220	--	--	--	--	--	--	74	--	--	--	--	67	--	52	--
B - 33D (6-8 FT)	--	1.3	0.43	2.5	6.1	--	1.6	--	--	--	**0.98**	--	--	--	--	1.9	--	--	--
B - 33F (10-12 FT)	--	--	0.32	0.91	3.6	--	--	--	--	--	0.42	--	--	--	--	0.37	--	--	--
B - 33H (14-16 FT)	3.5	--	9.9	5.8	3.9	--	--	--	--	--	1.6	--	--	--	--	0.83	--	--	--

IEPA CLEANUP OBJECTIVES

CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 34D (6-8 FT)	--	--	0.065	0.051	0.34	--	0.054	0.012	0.01	--	0.013	--	--	--	--	--	--	--	--
B - 34F (10-12 FT)	**2.8**	--	**10**	1.2	**16**	--	**0.99**	**1.1**	1.7	--	0.36	**6.8**	--	--	--	--	--	--	**0.43**
B - 34G (12-14 FT)	--	--	**2.1**	0.41	**13**	--	--	**0.44**	0.91	--	--	--	--	--	--	--	--	--	--
B - 35D (6-8 FT)	--	--	0.41	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 36F (10-12 FT)	**0.76**	--	**1.3**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 36H (14-16 FT)	**1.4**	--	**1.3**	--	--	--	--	--	0.35	--	--	--	--	--	--	--	--	--	--
B - 36I (16-18 FT)	**1.1**	--	0.96	--	--	--	--	--	0.89	--	--	--	--	--	--	--	--	--	--
B - 36I (16-18 FT) (DUP)	**1**	--	0.35	--	0.23	--	--	--	0.25	--	--	--	--	--	--	--	--	--	--
B - 36L (22-24 FT)	--	--	0.79	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 37H (14-16 FT)	--	--	**26**	**32**	--	--	--	--	--	--	**6.5**	--	--	--	--	--	--	--	--
B - 37I (16-18 FT)	--	--	**13**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 37J (18-20 FT)	--	--	**120**	**86**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 37K (20-22 FT)	NO VOLATILES DETECTED																		
B - 37L (22-24 FT)	--	--	**84**	**48**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 38I (16-18 FT)	**1.4**	--	0.4	0.28	--	--	--	--	--	--	--	--	--	--	--	0.3	--	--	--
B - 38K (20-22 FT)	**1.1**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.6	--	--	--
B - 38L (22-24 FT)	**0.6**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	--	--	--
B - 39C (4-6 FT)	**1.9**	--	**7.1**	5.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 39D (6-8 FT)	**2.7**	**2.9**	**21**	**14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 39E (8-10 FT)	**17**	--	**14**	**13**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

IEPA CLEANUP OBJECTIVES

	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABL⁻ SIX
VOLATILE ORGANIC COM… …ND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 39G (12-14 FT)	0.86	--	0.41	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 40E (8-10 FT)	--	0.73	0.89	0.43	6.6	--	1.2	--	--	--	0.33	--	--	--	--	0.25	--	--	--
B - 40G (12-14 FT)	2	--	13	1.9	6.2	--	--	1.1	0.91	--	0.54	--	--	--	--	--	--	--	--
B - 40I (16-18 FT)	--	--	**1.1**	--	6.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 41H (14-16 FT)	--	--	0.53	--	1.3	--	--	--	1.8	--	--	--	--	--	--	--	--	--	--
B - 42C (4-6 FT)	--	14	120	23	--	--	--	--	--	--	4.8	--	--	--	--	--	--	--	--
B - 42D (6-8 FT)	7.4	7	360	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 42E (8-10 FT)	1.6	--	35	8	--	--	--	--	--	--	1.6	--	--	--	--	--	--	--	--
B - 43D (6-8 FT)	--	--	0.38	--	1.7		--	--	--	--	--	--	--	--	--	--	--	--	--
B - 44B (2-4 FT)	--	--	--	0.015	0.061	--	--	--	--	--	0.006	--	--	--	--	--	--	--	--
B - 44C (4-6 FT)	--	--	--	--	--	1.1	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 44E (8-10 FT)	--	--	0.041	--	0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 45B (2-4 FT)	0.82	--	0.59	--	1.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 45E (8-10 FT)	--	--	--	--	4.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 46D (6-8 FT)	0.29	--	**1.6**	--	17	--	1.2	**0.26**	0.92	--	--	--	--	--	--	--	--	--	--
B - 46C (4-6 FT)	--	0.24	**1.8**	1.6	1.7	--	--	**0.27**	--	--	0.33	--	--	--	--	--	--	--	--
B - 46E (8-10 FT)	--	--	0.95	--	6.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 47C (4-6 FT)	--	--	4.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 47D (6-8 FT)	5	--	110	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 47E (8-10 FT)	--	--	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

IEPA CLEANUP OBJECTIVES

CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 48E (8-10 FT)	0.35	--	**2.1**	0.36	10	--	--	--	--	--	0.25	--	--	--	--	--	--	--	--
B - 49F (10-12 FT)	0.58	--	**1.4**	0.31	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 50E (8-10 FT)	0.78	--	**1.7**	1.3	--	--	--	--	--	--	0.37	--	--	--	--	0.83	--	--	--
B - 51E (8-10 FT)	--	--	0.011	0.009	0.42	--	0.096	--	--	--	--	--	--	--	--	--	--	--	--
B - 51G (12-14 FT)	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.71**	--	--	--	--	--
B - 51I (16-18 FT)	--	--	0.007	0.005	0.057	--	0.025	--	--	--	--	--	--	--	--	--	--	--	--
B - 52G (12-14 FT)	**0.006**	--	--	--	0.24	--	--	--	--	--	--	0.49	--	--	--	--	--	--	--
B - 52I (16-18 FT)	--	--	--	--	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--	--
B - 52J (18-20 FT)	--	--	0.029	--	0.41	--	0.2	--	0.023	--	--	**0.15**	--	--	--	--	--	--	--
B - 53H (14-16 FT)	NO VOLATILES DETECTED																		
B - 54E (8-10 FT)	--	--	0.5	1.1	2.3	--	--	--	0.41	--	1.4	--	--	--	--	0.75	--	--	--
B - 55H (14-16 FT)	**0.006**	--	--	--	0.022	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 56F (10-12 FT)	**0.013**	--	0.008	--	0.022	--	--	--	0.008	--	--	**0.027**	--	--	--	--	--	--	--
B - 56F (10-12 FT) (DUP)	**0.006**	--	0.009	--	0.023	--	--	--	0.014	--	--	**0.019**	--	--	--	--	--	--	--
B - 57F (10-12 FT)	--	4.7	29	30	--	--	--	--	--	--	13	23	--	--	--	19	--	--	--
B - 57H (14-16 FT)	--	--	0.4	--	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--	--
B - 57I (16-18 FT)	--	--	--	--	14	--	--	--	11	10	--	140	--	--	--	--	--	--	--
B - 57J (18-20 FT)	--	--	0.023	--	0.27	0.019	0.11	--	--	--	--	8.4	--	--	--	--	--	--	--
B - 58F (10-12 FT)	--	--	0.51	--	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 58G (12-14 FT)	--	--	--	--	14	--	1.1	--	1.6	--	--	--	--	--	--	--	--	--	--
IEPA CLEANUP OBJECTIVES																			
CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SIX
VOLATILE ORGANIC COMPOUND CONTAMINATION
(mg/kg)

BOREHOLE	BENZENE	TETRACHLOROETHENE	TOLUENE	TOTAL XYLENES	ACETONE	1,1,1-TRICHLOROETHANE	2-BUTANONE	CHLOROBENZENE	4-METHYL-2-PENTANONE	CARBON DISULFIDE	ETHYLBENZENE	METHYLENE CHLORIDE	CHLOROFORM	1,1-DICHLOROETHANE	TRICHLOROETHENE	STYRENE	2-CHLOROETHYL VINYL ETHER	DIBROMOETHANE	1,2-DICHLOROETHANE
B - 58H (14-16 FT)	--	--	**38**	**76**	**20**	--	--	**5.9**	--	--	**8.4**	**50**	--	--	--	--	--	--	--
B - 58I (16-18 FT)	--	--	**100**	**190**	--	--	--	**16**	--	--	**22**	--	--	--	--	--	--	--	--
B - 58J (18-20 FT)	--	--	0.38	0.28	**2.5**	--	--	--	0.54	--	--	**1.8**	--	--	--	--	--	--	**0.26**
B - 59B (2-4 FT)	**3.3**	--	**16**	6.8	**14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 59D (6-8 FT)	--	--	**14**	**17**	**73**	--	--	--	7.1	--	--	--	--	--	--	--	--	--	--
B - 59E (8-10 FT)	**140**	--	**630**	**180**	--	--	--	**110**	--	--	--	--	--	--	--	--	--	--	--
B - 59G (12-14 FT)	--	--	0.18	0.081	0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 59I (16-18 FT)	--	--	0.009	--	0.078	--	--	--	--	--	--	**0.055**	--	--	--	--	--	--	--
B - 60B (2-4 FT)	--	--	0.013	0.008	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 60D (6-8 FT)	**0.75**	--	**6.2**	3.3	--	--	--	--	--	--	**0.82**	**3.2**	--	--	--	1.8	--	--	--
B - 60E (8-10 FT)	**44**	--	**280**	**250**	--	--	--	**37**	--	--	**42**	--	--	--	--	--	--	--	--
B - 60G (12-14 FT)	--	--	**2**	3.2	--	--	--	**6.6**	--	--	0.41	--	--	--	--	--	--	--	--
B - 60J (18-20 FT)	**0.035**	--	0.16	0.1	**0.26**	--	--	--	0.033	--	--	--	--	--	--	--	--	--	--

IEPA CLEANUP OBJECTIVES

CLASS I	0.005	0.005	1.000	10.000	0.700	0.200	0.350	0.100	NE	0.70	0.700	0.005	DETEC	0.007	0.005	NE	NE	NE	0.005
CLASS II	0.025	0.025	2.500	10.000	0.700	1.000	0.350	0.500	NE	3.5	1.000	0.25	DETEC	0.035	0.025	NE	NE	NE	0.025

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTHALATE
B - 01F (10-12 FT)	NO BASE / NEUTRALS DETECTED																								
B - 02G (12-14 FT)	--	--	--	--	22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 02H (14-16 FT)	0.74	--	--	0.76	0.36	--	--	--	--	--	0.42	0.38	0.51	--	0.46	--	0.93	--	--	--	--	--	--	--	--
B - 02I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 03A (0-2 FT)	**8.3**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**8.5**	--	--	--	--	--	--	--	--
B - 04I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 05I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 06B (2-4 FT)	**7.3**	--	--	**5.6**	--	--	--	--	--	2.2	3.0	3.4	5.4	--	3.0	--	**6.7**	--	--	1.9	2	--	--	--	--
B - 07G (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 07G (12-14 FT)	55	--	--	47	--	--	--	--	--	19	29	31	47	--	29	--	56	**14**	14	19	**20**	--	--	--	--
B - 07I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 08E (8-10 FT)	1.7	--	--	2.9	1.9	--	--	--	--	--	3.1	3.5	6.3	--	4.4	--	3.1	--	1.3	1.7	2.0	--	--	--	--
B - 09D (6-8 FT)	--	--	--	--	68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 09E (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 10D (6-8 FT)	0.85	--	--	0.96	--	--	--	--	--	--	--	--	0.72	--	--	--	1.3	--	--	--	--	--	--	--	--
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0086	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTHALATE
B - 11F (10-12 FT)	**NO BASE / NEUTRALS DETECTED**																								
B - 12F (10-12 FT)	0.49	--	--	0.45	--	--	--	--	--	--	--	--	0.47	--	--	--	0.49	--	--	--	--	--	--	--	--
B - 13H (14-16 FT)	**NO BASE / NEUTRALS DETECTED**																								
B - 14C (4-6 FT)	--	--	--	1.1	--	--	--	--	--	--	0.69	0.78	1.5	--	--	--	1.3	--	--	--	--	--	--	--	--
B - 15G (12-14 FT)	**7.5**	--	--	3.9	15	2.4	--	--	3.7	1.8	--	2.1	3.7	--	1.7	2.0	4.8	2.8	--	--	1.9	--	--	--	--
B - 16F (10-12 FT)	--	--	--	--	--	--	--	--	--	--	--	--	0.85	--	--	--	--	--	--	--	--	--	--	--	--
B -17A (0-2 FT)	**5.6**	--	--	**5.4**	--	--	--	--	--	--	3.4	4.1	8.3	--	4.0	--	**6.9**	--	--	2.4	2.4	--	--	--	--
B - 18C (4-6 FT)	61	--	--	46	--	--	--	**10**	--	19	28	28	60	--	31	10	61	**16**	8.0	14	**15**	--	--	--	--
B - 18E (8-10 FT)	**11**	--	--	**7.1**	11	6.6	--	3.3	2.9	3.1	2.9	2.9	4.8	7.6	3.0	2.1	**7.1**	5.4	--	--	--	--	--	--	--
B - 18I (16-18 FT)	**NO BASE / NEUTRALS DETECTED**																								
B - 19G (12-14 FT)	**20**	--	--	**14**	5.6	--	--	3.9	--	6.6	6.7	6.0	6.1	--	7.3	4.0	**17**	**6.7**	--	--	3.3	--	--	--	--
B - 20E (8-10 FT)	250	--	--	120	350	200	--	43	140	**61**	42	48	57	--	44	--	98	110	--	--	--	--	--	--	--
B - 20G (12-14 FT)	1.4	--	--	0.90	0.83	0.96	--	--	0.57	0.42	0.38	0.40	0.33	--	0.39	--	0.82	0.55	0.42	--	--	--	--	--	--
B - 21B (2-4 FT)	--	--	--	--	--	--	--	--	2.0	--	--	1.8	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 22I (16-18 FT)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.43	--	--	--
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0036	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTHALATE
B - 23D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
B - 24J (18-20 FT)	NO BASE / NEUTRALS DETECTED																								
B- 25C (4-6 FT)	NO BASE / NEUTRALS DETECTED																								
B - 26G (12-14 FT)	NO BASE / NEUTRALS DETECTED																								
B - 27C (4-6 FT)	**4.2**	47	12	--	13	18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	--	--
B - 27C (DUP)	0.81	7.7	--	--	2.3	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.4	--	--
B - 27E (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B -27H (14-16 FT)	NO BASE / NEUTRALS DETECTED																								
B - 28C (4-6 FT)	--	--	--	--	--	--	27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 28G (12-14 FT)	--	--	--	--	--	--	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 28I (16-18 FT)	--	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 29O (28-30 FT)	NO BASE / NEUTRALS DETECTED																								
B - 30N (26-28 FT)	NO BASE / NEUTRALS DETECTED																								
B - 31H (14-16 FT)	NO BASE / NEUTRALS DETECTED																								
B - 32F (10-12 FT)	NO BASE / NEUTRALS DETECTED																								
B - 32G (12-14 FT)	--	--	--	--	78	200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0086	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTHALATE
B - 33C (4-6 FT)	NO BASE / NEUTRALS DETECTED																								
B - 34F (10-12 FT)	NO BASE / NEUTRALS DETECTED																								
B - 35D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
B - 36I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 36I (DUP)	NO BASE / NEUTRALS DETECTED																								
B - 37I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 38K (20-22 FT)	NO BASE / NEUTRALS DETECTED																								
B - 39E (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 40G (12-14 FT)	NO BASE / NEUTRALS DETECTED																								
B - 41H (14-16 FT)	NO BASE / NEUTRALS DETECTED																								
B - 42D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
B - 43D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
B - 44C (4-6 FT)	NO BASE / NEUTRALS DETECTED																								
B - 45B (2-4 FT)	NO BASE / NEUTRALS DETECTED																								
B - 46D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0086	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTHALATE
B - 47D (6-8 FT)	3.5	--	--	--	--	4.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 48D (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 49F (10-12 FT)	NO BASE / NEUTRALS DETECTED																								
B - 50E (8-10 FT)	--	--	--	--	0.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 51G (12-14 FT)	0.45	--	--	--	0.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B -52G (14-16 FT)	NO BASE / NEUTRALS DETECTED																								
B - 53H (14-16 FT)	NO BASE / NEUTRALS DETECTED																								
B - 54E (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 55G (12-14 FT)	NO BASE / NEUTRALS DETECTED																								
B - 56F (10-12 FT)	NO BASE / NEUTRALS DETECTED																								
B - 57I (16-18 FT)	NO BASE / NEUTRALS DETECTED																								
B - 58E (8-10 FT)	NO BASE / NEUTRALS DETECTED																								
B - 59B (2-4 FT)	**4.8**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 59D (6-8 FT)	NO BASE / NEUTRALS DETECTED																								
B - 59E (8-10 FT)	--	900	3800	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	380	--
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0086	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE SEVEN
BASE /NEUTRAL EXTRACTABLE CONTAMINATION (mg/kg)

SAMPLE # (DEPTH)	PHENANTHRENE	HEXACHLOROBENZENE	HEXACHLOROCYCLOPENTADIENE	PYRENE	NAPTHALENE	2-METHYLNAPHTHALENE	1,2,4 -TRICHLOROBENZENE	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a) ANTHRACENE	BENZO(a) PYRENE	BENZO(b)FLUORANTHENE	4-CHLOROANILINE	CHRYSENE	DIBENZOFURAN	FLUORANTHENE	FLUORENE	BENZO(k) FLUORANTHENE	INDENO (1,2,3-CD) PYRENE	BENZO(g,h,i) PERYLENE	2,6 - DINITROTOLUENE	NITROBENENZENE	1,2 - DICHLOROBENZENE	DIETHYLPHTALATE
B - 59G (12-14 FT)	--	0.59	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 59I (16-18 FT)	--	--	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 60B (2-4 FT)	--	0.79	--	0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 60D (6-8 FT)	1.7	--	--	--	**2.0**	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 60E (8-10 FT)	**370**	250	700	**200**	**580**	97	--	--	--	--	--	--	**120**	--	--	93	**220**	**86**	--	--	--	--	--	87	170
B - 60G (12-14 FT)	--	2.1	5.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B - 60J (18-20 FT)	NO BASE / NEUTRALS DETECTED																								
IEPA CLEANUP OBJECTIVES																									
CLASS I	4.2	NE	NE	4.2	0.025	NE	NE	8.4	4.2	42.0	0.0026	0.0046	0.0036	NE	0.03	NE	5.6	5.5	0.0034	0.0086	4.2	NE	NE	NE	NE
CLASS II	21.0	NE	NE	21.0	0.039	NE	NE	42.0	21.0	210.0	0.013	0.023	0.017	NE	0.15	NE	28.0	28.0	0.017	0.043	21.0	NE	NE	NE	NE

NOTE:

Bolded areas indicate concentrations above the generic IEPA Class I Cleanup Objectives.

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE EIGHT
ACID EXTRACTABLE CONTAMINATION
(mg/kg)

SAMPLE # (DEPTH)	2,4 DIMETHYL	4-METHLY	PHENOL	2,4-DICHLORO	2,6-DICHLORO	2-CHLORO
B - 01F (10-12 FT)	NO ACIDS DETECTED					
B - 02G (12-14 FT)	NO ACIDS DETECTED					
B - 03A (0-2 FT)	NO ACIDS DETECTED					
B - 04I (16-18 FT)	NO ACIDS DETECTED					
B - 05I (16-18 FT)	NO ACIDS DETECTED					
B - 06B (2-4 FT)	NO ACIDS DETECTED					
B - 07G (12-14 FT)	NO ACIDS DETECTED					
B - 08E (8-10 FT)	NO ACIDS DETECTED					
B - 09D (6-8 FT)	--	50	49	--	--	--
B - 09E (8-10 FT)	--	12	68	--	--	--
B - 10D (6-8 FT)	--	--	--	9.6	--	--
B - 10E (8-10 FT)	--	--	--	4.7	0.5	--
B - 11F (10-12 FT)	NO ACIDS DETECTED					
B - 12F (10-12 FT)	NO ACIDS DETECTED					
B - 13H (14-16)	--	27	61	--	--	--
B - 13J (18-20 FT)	--	--	0.7	--	--	--
B - 14C (4-6 FT)	NO ACIDS DETECTED					
B - 15G (12-14 FT)	NO ACIDS DETECTED					
B - 16F (10-12 FT)	NO ACIDS DETECTED					
B - 17A (0-2 FT)	NO ACIDS DETECTED					
B - 18C (4-6 FT)	NO ACIDS DETECTED					
B - 18E (8-10 FT)	NO ACIDS DETECTED					
B - 18I (16-18 FT)	--	--	0.49	--	--	--
B - 19G (12-14 FT)	NO ACIDS DETECTED					
B - 20E (8-10 FT)	NO ACIDS DETECTED					
B - 20G (12-14 FT)	NO ACIDS DETECTED					
B - 21B (2-4 FT)	NO ACIDS DETECTED					
B - 22I (16-18 FT)	NO ACIDS DETECTED					
B - 23D (6 -8 FT)	NO ACIDS DETECTED					
B - 24J (18-20 FT)	NO ACIDS DETECTED					
B - 25C (4-6 FT)	NO ACIDS DETECTED					
B - 26G (12-14 FT)	NO ACIDS DETECTED					
B - 27C (4-6 FT)	--	--	--	23	--	16
B - 27C (4-6 FT) (DUP)	--	--	2.5	4.9	--	3.9
B - 27E (8-10 FT)	--	--	8.3	3.3	--	--
B - 27H (14-16 FT)	--	--	--	--	--	--
B - 28C (4-6 FT)	--	--	3.3	--	--	--
B - 28G (12-14 FT)	--	8.6	26	--	--	--
B - 28I (16-18 FT)	--	5.5	29	--	--	--
B - 29O (28-30 FT)	NO ACIDS DETECTED					
B - 30N (26-28 FT)	NO ACIDS DETECTED					
B - 31F (10-12 FT)	NO ACIDS DETECTED					

IEPA CLEANUP OBJECTIVES

CLASS I	NE	0.035	0.1	NE	NE	NE
CLASS II	NE	0.035	0.1	NE	NE	NE

NOTE:

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE EIGHT
ACID EXTRACTABLE CONTAMINATION
(mg/kg)

SAMPLE # (DEPTH)	2,4 DIMETHYL	4-METHLY	PHENOL	2,4-DICHLORO	2,6-DICHLORO	2-CHLORO
B - 31H (14-16 FT)	–	–	7.4	–	–	–
B - 32F (10-12 FT)	NO ACIDS DETECTED					
B - 32G (12-14 FT)	NO ACIDS DETECTED					
B - 33C (4-6 FT)	–	2300	2800	–	–	–
B - 33D (6-8 FT)	–	93	170	–	–	–
B - 33E (8-10 FT)	–	54	120	–	–	–
B - 33H (14-16 FT)	–	–	92	–	–	–
B - 34E (8-10 FT)	–	7	40	–	–	–
B - 34F (10-12 FT)	–	–	23	–	–	–
B - 34G (12-14 FT)	–	–	300	–	–	–
B - 35D (6-8 FT)	NO ACIDS DETECTED					
B - 36I (16-18 FT)	NO ACIDS DETECTED					
B- 36I (16-18 FT) (DUP)	NO ACIDS DETECTED					
B - 37E (8-10 FT)	NO ACIDS DETECTED					
B - 37H (14-16 FT)	NO ACIDS DETECTED					
B - 37I (16-18 FT)	–	–	4	6	0.87	–
B - 37J (18-20 FT)	NO ACIDS DETECTED					
B - 38I (16-18 FT)	NO ACIDS DETECTED					
B - 38K (20-22 FT)	–	2.4	1.7	–	–	–
B - 38L (22-24 FT)	0.53	5	4	–	–	–
B - 39E (8-10 FT)	NO ACIDS DETECTED					
B - 40E (8-10 FT)	–	53	110	–	–	–
B - 40G (12-14 FT)	–	37	250	–	–	–
B - 40I (16-18 FT)	–	15	76	–	–	–
B - 41F (10-12 FT)	–	–	7.3	–	–	–
B - 41H (14-16 FT)	–	–	7.6	–	–	–
B - 42D (6-8 FT)	NO ACIDS DETECTED					
B - 43C (4-6 FT)	–	–	1.3	–	–	–
B - 43D (6-8 FT)	–	–	19	–	–	–
B - 43E (8-10 FT)	–	–	17	–	–	–
B - 44C (4-6 FT)	–	–	3.7	–	–	–
B - 44E (8-10 FT)	–	–	28	–	–	–
B - 45B (2-4 FT)	NO ACIDS DETECTED					
B - 46C (4-6 FT)	–	–	160	–	–	–
B - 46D (6-8 FT)	–	33	390	–	–	–
B - 46E (8-10 FT)	–	24	190	–	–	–
B - 47D (6-8 FT)	NO ACIDS DETECTED					
B - 48D (6-8 FT)	42	–	79	–	–	–
B - 48E (8-10 FT)	–	21	120	–	–	–
B - 49C (4-6 FT)	–	–	1.1	–	–	–
B - 49F (10-12 FT)	–	8	38	29	9.8	–
B - 49G (12-14 FT)	–	–	15	–	–	–

IEPA CLEANUP OBJECTIVES

CLASS I	NE	0.035	0.1	NE	NE	NE
CLASS II	NE	0.035	0.1	NE	NE	NE

NOTE:

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

TABLE EIGHT
ACID EXTRACTABLE CONTAMINATION
(mg/kg)

SAMPLE # (DEPTH)	2,4 DIMETHYL	4-METHLY	PHENOL	2,4-DICHLORO	2,6-DICHLORO	2-CHLORO
B - 49J (18-20 FT)	--	--	0.49	--	--	--
B - 50E (8-10 FT)	--	--	0.8	--	--	--
B - 51G (12-14 FT)	NO ACIDS DETECTED					
B - 52G (14-16 FT)	NO ACIDS DETECTED					
B - 53F 910-12 FT)	--	--	9.8	--	--	--
B - 53H (14-16 FT)	--	4.5	5	--	--	--
B - 53I (16-18 FT)	--	26	24	--	--	--
B - 54E (8-10 FT)	--	3.1	4.8	--	--	--
B - 54G (12-14 FT)	--	2.8	4.7	--	--	--
B - 55G (12-14 FT)	--	--	3.3	--	--	--
B - 56F (10-12 FT)	NO ACIDS DETECTED					
B - 57E (8-10 FT)	3.3	37	39	--	--	--
B - 57F (10-12 FT)	8.1	40	33	--	--	--
B - 57F (10-12 FT) (DUP)	6.9	47	49	--	--	--
B - 57H (14-16 FT)	0.36	0.64	--	--	--	--
B - 57I (16-18 FT)	8.1	62	78	--	--	--
B - 57J (18-20 FT)	12	3.6	--	--	--	--
B - 57J (18-20 FT) (DUP)	0.36	1.6	--	--	--	--
B - 58D (6-8 FT)	--	--	7.2	--	--	--
B - 58E (8-10 FT)	--	--	29	16	--	--
B - 58G (12-14 FT)	--	--	65	--	--	--
B - 58I (16-18 FT)	--	7.9	30	32	5.1	4.4
B - 58J (18-20 FT)	--	0.76	6.1	1.4	--	--
B - 59B (2-4 FT)	--	--	30	--	--	--
B - 59D (6-8 FT)	--	--	--	37	14	--
B - 59E (8-10 FT)	--	--	--	760	--	--
B - 59G (12-14 FT)	--	--	--	1.7	0.37	--
B - 59I (16-18 FT)	NO ACIDS DETECTED					
B - 60B (2-4 FT)	NO ACIDS DETECTED					
B - 60D (6-8 FT)	--	0.98	4.8	1.3	--	--
B - 60E (8-10 FT)	--	--	--	130	--	--
B - 60G (12-14 FT)	--	--	--	14	4	2.2
B - 60J (18-20 FT)	NO ACIDS DETECTED					

IEPA CLEANUP OBJECTIVES

CLASS I	NE	0.035	0.1	NE	NE	NE
CLASS II	NE	0.035	0.1	NE	NE	NE

NOTE:

Shaded areas indicate concentrations above the generic IEPA Class II Cleanup Objectives.

CARLSON ENVIRONMENTAL, Inc.

ATTACHMENT D

Figures

312 West Randolph Street • Chicago, Illinois 60606 • (312) 346-2140

N

REFERENCE DRAWING:

AERIAL PHOTOGRAPH
2140 WOLF ROAD, DES PLAINES, ILLINOIS
BY: GEONEX CAS NEG No. 92100-37B-49
APPROXIMATE SCALE: 1"=2000' DATE 05-05-92

U.S.G.S. QUADRANGLE MAP
LAKE CALUMET, ILLINOIS
BY: AMERICAN DIGITAL CARTOGRAPHY, INC.
3003 WEST COLLEGE AVENUE, APPLETON, WISCONSIN

SCALE

800 0 800 1600 2400 FEET

CARLSON ENVIRONMENTAL, INC.
312 WEST RANDOLPH STREET
CHICAGO, ILLINOIS 60606
(312) 346-2140

RECEIVED
MAY - 6 1996
IEPA
PERMIT SECTION

FIGURE ONE
AREA MAP

CLEAN HARBORS OF CHICAGO, INC.
11800 SOUTH STONY ISLAND AVENUE
CHICAGO, ILLINOIS

TOWNSHIP 37N, RANGE 14E, SECTION 23/24

DRAWN BY: P. HOEKSEMA	DATE:05/01/96	SIZE E	SCALE: 1" = 800'
CHECKED BY:	PROJECT NO. 8666	FILE NO. AERIAL.DW2	

LEGEND

CURRENT SWMU/AOC	AREA
SWMU 7	CHLOROBENZENE CONTAMINATED AREA
SWMU 8	AUXILIARY BASIN NO.3
SWMU 9	LANDFILL
SWMU 10	FORMER TEMPORARY PICKLE LIQUOR BASINS
SWMU 11	FORMER PERMANENT PICKLE LIQUOR DISPOSAL SITES
SWMU 12	FORMER PERMANENT PICKLE LIQUOR BASINS
SWMU 13	FORMER OIL BASINS
SWMU 15	OIL CONTAMINATED STORAGE AREA
SWMU 16	TANKS 1-4
AOC 1	NORTHERN PORTION OF PROCESS BUILDING NO.1
AOC 2	SOUTHERN PORTION OF PROCESS BUILDING NO.1

CARLSON ENVIRONMENTAL, INC.
312 WEST RANDOLPH STREET
CHICAGO, ILLINOIS 60606
(312) 346-2140

FIGURE TWO
LOCATION OF RFI SWMUs AND AOCs

CLEAN HARBORS OF CHICAGO, INC.
11800 SOUTH STONY ISLAND AVENUE
CHICAGO, ILLINOIS

DRAWN BY: P. HOEKSEMA	05/01/96	SIZE E	SCALE 1"=70'
CHECKED BY:	PROJECT NO. 8666	FILE NO. FIG3.DW2	

LEGEND

CURRENT SWMU/AOC	AREA
SWMU 7	CHLOROBENZENE CONTAMINATED AREA
SWMU 8	AUXILIARY BASIN NO.3
SWMU 9	LANDFILL
SWMU 10	FORMER TEMPORARY PICKLE LIQUOR BASINS
SWMU 11	FORMER PERMANENT PICKLE LIQUOR DISPOSAL SITES
SWMU 12	FORMER PERMANENT PICKLE LIQUOR BASINS
SWMU 13	FORMER OIL BASINS
SWMU 15	OIL CONTAMINATED STORAGE AREA
SWMU 16	TANKS 1-4
AOC 1	NORTHERN PORTION OF PROCESS BUILDING NO.1
AOC 2	SOUTHERN PORTION OF PROCESS BUILDING NO.1

- FORMER SOIL BORING LOCATION
- FORMER ANGLED SOIL BORING LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED ANGLED SOIL BORING LOCATION
- PROPOSED MONITORING WELL LOCATION
- PROPOSED WELL POINT LOCATION

CARLSON ENVIRONMENTAL, INC.
312 WEST RANDOLPH STREET
CHICAGO, ILLINOIS 60606
(312) 346-2140

FIGURE THREE
PROPOSED SAMPLING LOCATIONS

CLEAN HARBORS OF CHICAGO, INC.
11800 SOUTH STONY ISLAND AVENUE
CHICAGO, ILLINOIS

DRAWN BY: P. HOEKSEMA	05/01/96	SIZE E	SCALE 1"=70'
CHECKED BY:	PROJECT NO. 8666	FILE NO. FIG4.DW2	